MANAGEMENT ACCOUNTANCY IN CEYLON

A.H.M.Bennett



Academy of Administrative Studies

MANAGEMENT ACCOUNTANCY IN CEYLON

This basic text supplies a comprehensive introduction to modern finanmanagement and management accountancy techniques in a Ceylon context. Section I explains the new role of the accountant as an "information engineer", and as a participant in general management. Section II discusses possible financial objectives in the private sector, while Section III covers methods of evaluation expenditure proposals, both discounted cash flow and traditional methods, with examples. Section IV deals with financial planning and budgeting, Section V with sources of finance available to the Ceylon entrepreneur, and Section VI with financial control. Section VII on financial ratios includes original data on profitability and other key ratios of rupee companies. The last Section applies a systems approach to accountancy and explains the design of accounting procedures and the wide range of office machines and equipment available, including computers.

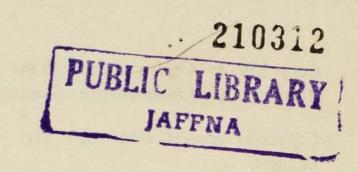
Each Section is followed by typical examination questions and suggested answers as a guide to students. Interest tables and a bibliography are appended. The author has drawn on the latest developments in accounting theory, and used his training experience in Ceylon to put the subject in a readily assimilable and usable form.

The book has been written for students of accountancy, economics, banking and management. It should also prove an invaluable handbook for those practising in these areas.



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FOREWORD

The need for a textbook on management accountancy, written with the Ceylon reader in mind, was forcibly brought to the notice of the Academy of Administrative Studies when the course leading to the Diploma in Public Financial Management was launched four years ago. The Academy of Administrative Studies was fortunate in that Mr. A. H. M. Bennett, who is the Colombo Plan Adviser in Financial Management to the Academy, came forward to fill this need.

This book on "Management Accountancy in Ceylon" grew out of the material which was prepared for teaching purposes in the training courses conducted by the Academy of Administrative Studies during the past four years. The basic material has been elaborated to provide a comprehensive textbook for the student as well as a reference work for the practitioner.

The Academy of Administrative Studies is grateful to Mr. Bennett for the considerable effort he has put into the task of preparing this book. If it were not for his dedication and enthusiasm, this book would not have seen the light of day.

Faced with a situation of heightened public expectations, coupled with scarce resources for investment to meet such expectations, the need for optimising the productivity from our investments becomes all the more urgent for us in Ceylon. It is in this context that the role of management accounting in our organisation has to be understood. It would be no exaggeration to say that management accounting is one of the disciplines of management which would have major relevance to the performance and productivity of the organisations both in the public sector and private sector in Ceylon.

Hence the need for a large number of practitioners of this discipline. The Academy of Administrative Studies has concentrated, over the last four years, both in training such practitioners for the public sector, as well as in generating an appreciation of this discipline in the ranks of high level decision makers.

The Academy of Administrative Studies, therefore, takes great pleasure in presenting this publication on "Management Accountancy in Ceylon" as a contribution to the development of management in our country.

H. S. Wanasinghe

Director, Academy of Administrative Studies, and
Director General of Public Administration.

Academy of Administrative Studies, 28/10, Longden Place, Colombo 7.

MESSAGES



SECRETARY TO THE TREASURY

Mr. A. H. M. Bennett's "Management Accountancy in Ceylon" will be welcomed by all who are interested in the profession of Accountancy in Ceylon.

When a group of Permanent Secretaries reported in 1966 on Administrative Reforms necessary for Development Administration they commented on the preoccupation of Government Accountants with regularity and recommended that the Accountants should be retrained to play their rightful role as financial advisers on the management team. The outcome of this recommendation was a Training Course at the Academy of Administrative Studies. Mr. Bennett was associated with the Course from its inception.

The book he has produced is a comprehensive guide to Management Accountancy in the circumstances of Ceylon. It will be invaluable not merely to Government Accountants who follow courses in Financial Management at the Academy but also to all students of Accountancy and to practitioners as well. Being the first of its kind to be published in Ceylon, I trust it will have a wide circulation and help to improve the quality of Financial Management in Public Corporations, Government Departments and the Private Sector.

M. Rajendra
Secretary to the Treasury

Colombo 1. March 21, 1971.

THE INSTITUTE OF CHARTERED ACCOUNTANTS OF CEYLON

The author of this publication is to be congratulated on bringing out a text book on Management Accountancy with special reference to conditions in Ceylon. Not only is it the first of its kind to be published in Ceylon but it is also the first authoritative work on an accountancy subject to be published locally. The subject itself is one of fairly recent evolution and is rapidly finding acceptance as a very useful tool of management in many countries. Hence arises its importance to the accountancy profession as a whole as also to those at the helm of Industry, Commerce and Trade.

The book, though primarily intended for accountancy students as explained in the Author's Preface, should indeed prove equally useful to accountants whether employed in business undertakings or in public practice. In view of the fact that Management Accountancy has been only recently introduced as a subject for the Final Examination of the Institute of Chartered Accountants of Ceylon, the Institute is specially appreciative of this valuable contribution to accountancy literature by Mr. Bennett.

A noteworthy feature of the work is its wide coverage and depth of detail which enhances its value not only as a text book but also as a reference book to both students and accountants alike.

The author of the book is Mr. A. H. M. Bennett, F.C.A. (England & Wales), who is presently in Ceylon as Colombo Plan Adviser in Financial Management at the Government-run Academy of Administrative Studies. During this period the Institute was fortunate in securing his services for lecturing to Articled Clerks on Management Accountancy, as well as for the conduct of seminars on the subject for members.

It gives me much pleasure, therefore, to commend this as an indispensable text book to accountancy students and as a very useful manual on Management Accountancy and Financial Management to all accountants whether employed in business undertakings, state corporations, or in public practice.

D. S. de Silva
President,
Institute of Chartered Accountants of Ceylon

Colombo 7. 28th April, 1971.

ASSOCIATION OF COST & WORKS ACCOUNTANTS IN CEYLON

The contributions made by the Accountancy profession in Ceylon to national development which are obviously immeasurable, will no doubt have made a significant impact, but in the last two decades or so, although there has been a substantial increase in the number of qualified Accountants, they have made very few contributions of any significance to the Accountants' library. However, in one particular aspect, viz. education and training of Accountants in Ceylon, considerable efforts have been made in recent years, and in this regard the country is indebted to individuals like Mr. A. H. M. Bennett who have spent a considerable amount of their time, often volunteering to fill the large gaps that have been existing in the Accountancy educational set-up.

It is in this context that a book such as "Management Accountancy in Ceylon" is received with a sense of gratitude, and I feel sure that this volume will assist the qualified Accountants as well as the students.

An interesting feature about the book "Management Accountancy in Ceylon" is that in addition to the comprehensive coverage given for the conventional areas such as Financial Objectives, Evaluation, Planning etc., a very valuable section has been devoted to the local finance market. Of particular interest are the sections devoted to the institutional participants in the local finance scene. Mr. Bennett who has spent practically all his time in Ceylon in the dissemination of knoweldge in this field, has been able to accumulate a wealth of information regarding the local situation, and he has very ably demonstrated how the techniques of Management Accountancy can be used to tackle the situation. Considered in that light this book should be recommended as a valuable item in the library of all Accountants in developing countries.

This is the first book of this nature in Ceylon, and in addition to the extensive educational value of this book, it will also be the corner stone in the Accountancy educational efforts in the Island.

M. T. A. Furkhan

President,

Association of Cost & Works Accountants in Ceylon

Colombo, 18th May, 1971.

AUTHOR'S PREFACE

This book is intended for Government accountants taking the Diploma in Public Financial Management (Part II paper in Management Accountancy-General), and for students of the Institute of Chartered Accountants of Ceylon (Final examination paper in Management Accounting-including costing). For their benefit, suggested answers have been provided to typical examination questions at the end of each section. These answers are not, of course, endorsed by the examining bodies. It may also prove useful to students for the Institute of Cost and Works Accountants Parts IV and V examinations, and to accountants in industry and practice.

The title needs a word of explanation. Accountancy is fundamentally the same the world over. However, the special conditions prevailing in Ceylon put the subject in a new context. The principal differences are (i) the importance of physical limiting factors such as imported materials, irrespective of the rupee funds available to buy them (ii) the prevalence of small scale businesses (iii) the law and institutions of Ceylon, and (iv) differences in accounting ratios such as gearing ratios.

I am deeply indebted to Mr. H. S. Wanasinghe, formerly Director of Training, for making this work possible, and to Mr. P. Sivasubramaniam, Training and Research Associate, and Mr. R. S. Wijeysekera, Forbes and Walker Ltd., for their continual help and advice. Acknowledgements and thanks for permission to reproduce material are also due to the Colombo Brokers' Association, Institute of Chartered Accountants (England and Wales), Institute of Chartered Accountants of Ceylon, Institute of Cost and Works Accountants, and the Association of Certified and Corporate Accountants.

A. H. M. Bennett

Colombo, May 1971.

SECTION I

INTRODUCTION TO MANAGEMENT ACCOUNTANCY

1.1 MANAGEMENT ACCOUNTING

"A broad new field of accounting has evolved since the beginning of the 20th century. While it had its origin in historical financial accounting and cost accounting, it is designed to provide financial data to guide management actions oriented towards the present and future. It serves management at all levels. The term management accounting describes this field with accuracy and seems to be gaining rapid and widespread acceptance" (National Association of Accountants (U. S.) 1963).

The Institute of Cost and Works Accountants, in "Terminology of Cost Accountancy" (1966), defines management accounting as "the presentation of accounting information in such a way as to assist management in the creation of policy and in the day-to-day operation of an undertaking." Management accounting services are defined as "the application of accounting knowledge for the purpose of organising, selecting, compiling and presenting accounting, quantitative and statistical information derived from all the relevant records of a business to assist those responsible for management in controlling the business and in the making of day-to-day decisions and in the formation of policy, together with the application of knowledge and experience of:

- (a) techniques for the organisation, control and measurement of production and ancillary services and for the control, measurement and remuneration of human effort;
- (b) commercial and management practices; and
- (c) office organisation, methods and equipment

The term "management accountancy" is used to refer to this wider field.

Management accounting is also called "decision accounting", "control accounting", or (U. S.) "managerial accounting".

Note especially in the above definitions:

(i) the management accountant provides an information service. An organisation is more than men, materials and machines. The dynamic element which motivates and co-ordinates these resources and turns them into a productive organisation is management. For this purpose, management require the further resource of information. The management accountant organises data collection, storage, processing and reporting procedures so as to provide the financial information required by each manager, at the time required and in the form required. He is an "information engineer."

- (ii) financial information includes not only costs, revenues, assets and liabilities, but also the underlying quantitative data on sales, stocks, production, labour hours, personnel, quantities of materials used, etc.
- (iii) all levels of management have financial responsibilities and require financial information to assist them in discharging their responsibilities, from Chairman of the Board of Directors down to each first line supervisor.

The process of management can be seen as a series of decisions. Each decision is a choice amongst available alternatives according to certain criteria or objectives, and the job of the management accountant is to illuminate the alternatives in the light of the organisation's financial objectives, whatever these may be. For example:

- in a profit seeking enterprise, the transport manager has the alternative of running a lorry at night to cope with a heavy workload or hiring an extra vehicle, or contracting the work to a carrier; the management accountant provides the cost of each alternative so that the manager can judge which is best.
- in a hospital which aims to cover its costs, there is the question of whether to charge extra for special attendants; the management accountant can calculate the total cost of this service (not just wages), advise whether the present charge covers it, and how the cost might be recovered.

In all such decisions, the manager needs to know future costs, revenues, etc., not past costs. The financial and cost accounts contain only past costs. Future costs are estimated by reference to past costs, with due allowance for expected changes. This point is often forgotten in practice; accountants prefer to quote past costs which are definitely known and accurate and readily available, rather than future costs which are indefinite estimates, and may be obtainable only from sources outside their control. It cannot be too strongly emphasised that it is the best available estimate of future costs that managers need; though they may prove wrong, the error is less than if past costs are quoted without allowance for future changes.

The other side to management accountancy is the provision of information for control. Management is commonly separated into a planning phase (choice from alternatives) and a control phase. The latter consists of comparing actual results with the plan on a continuous or regular basis, and replanning how to correct deviations from plan. The management accountant provides information on actual results, planned results and differences (exceptions or variances), and an analysis of the separate causes of differences which will assist in getting back to the plan (or sometimes in changing the original plan). As before, he provides relevant information at each and every level of the organisation. When plans and results are expressed in financial terms, this is called budgetary control. This technique is so important it may be considered the centrepiece of management accountancy. Applied comprehensively,

all the operations of a business – production, sales, distribution, administration, etc. – are expressed in terms of the common denominator of money. It is for this reason that accounting has been called "the language of business."

Another change of emphasis found in management accountancy is towards speed at the expense of accuracy. An information service must be geared to the day-to-day operating needs of managers. Late information is often unusable, and may even be disastrous, e.g. if the cash forecast is late, orders might be taken which are within the firm's production capacity but which would result in a cash shortage, and even bankruptcy. Fortunately, managers (unlike auditors) do not need meticulous accuracy: two or three significant figures are usually sufficient for any decision between alternatives. In fact, more than two or three figures tends to confuse the issue; from a communications point of view extra accuracy is a positive disadvantage.

The expression management accounting developed in the industrialised nations in the 1950's. In 1954 the Institute of Chartered Accountants (England and Wales) issued a pamphlet commenting that the expression had been used increasingly in recent years to mean the application of accounting skill to problems of management. In the late 50's and early 60's it was recognised that insufficient attention had been paid to this aspect of accounting. Courses, seminars and articles in professional journals proliferated. In 1964, the five major UK accountancy bodies (the Institutes of Chartered Accountants in England and Wales, Scotland, and Ireland, the Institute of Cost and Works Accountants, and the Association of Certified and Corporate Accountants) introduced a new high-level qualification, the Joint Diploma in Management Accounting Services. These services were defined as above. Joint Diploma has been called the "Ph. D. of accounting." Changes were also made in the standard professional syllabi reflecting the increased importance attached to management accounting.

1.2 FINANCIAL ACCOUNTING

Financial accounting is recording financial transactions, and processing and summarising them for the purpose of reporting to owners and creditors on how their money has been used. Also called "stewardship accounting". This contrasts with management accounting in two ways –

- (i) financial accounting serves mainly owners and creditors, whereas management accounting serves the management.
- (ii) financial accounting is concerned with the past, whereas management accounting is concerned essentially with the future, i.e. with effects of decisions.

The management accountant uses the financial records in two ways:

(i) he compares actual data against expectations, as set out in a budget, or standards, or data from other firms. This helps him to advise management on control decisions;

and

(ii) he projects past data into the future, making due allowance for known changes, to assist him in determining the financial effects of alternative decisions to advise management on planning decisions.

He must understand the principles and conventions of financial accounting, though he is not normally concerned in actually writing up the books, or preparing final accounts.

1.3 COST ACCOUNTING

"The process of accounting for cost from the point at which expenditure is incurred or committed to the establishment of its ultimate relationship with cost centres and cost units. In its widest usage it embraces the preparation of statistical data, the application of cost control methods, and the ascertainment of the profitability of activities carried out or planned". (ICWA)

Cost accounting may be seen as an analysis of recorded costs (and sometimes revenues also) for the purpose of cost control, profit analysis, estimating and pricing. Whereas financial accounting is content to record for instance, total purchases, cost accounting breaks this down over the different products or services provided by the firm. Nowadays, firms often integrate their financial records and costing records into a single system, to avoid the trouble and time spent in reconciling separate sets of figures.

This makes cost accounting appear to be part of financial accounting, a part which has been developed as a separate discipline, and in a sense it is. But cost accounting serves management rather than the owners and creditors, and is more a part of management accounting. In a small firm the cost accountant is probably also the management accountant. He reports actual costs against expected costs (an essential element in cost control); he provides an analysis of costs over the different sources of revenue (profit analysis), thus indicating to management which are the profitable lines (e.g. for expansion), and which are the unprofitable lines (e.g. for price increase, or contraction, or even close down); he assists in pricing decisions by estimating future costs on the basis of past costs. All these are within the definition of management accounting.

1.4 STATISTICS

Is the mathematical discipline concerned with masses of numerical data of any kind. It comprises descriptive statistics, i.e. the collection, summarisation, interpretation and presentation of data, and statistical methods for inferring information from incomplete data.

Uses in business include the following:

(i) defining the relationship between variables, e.g. between total cost and volume of production, by regression analysis;

- (ii) ascertaining the extent to which variables move together, e.g. sales volume with advertising expenditure, by correlation;
- (iii) construction of index numbers, e.g. to ascertain the increase in the price level of capital assets, goods or services purchased or provided by the firm;
- (iv) forecasting by ascertaining and projecting trends in past data, using time series analysis;
- (v) estimation by sampling, especially in quality control, and market research (see also section 8.29 on use of statistical sampling theory in management accountancy);
- (vi) design of research experiments to test hypotheses.

The management accountant should have a good understanding of the uses and limitations of statistical methods though he will not usually be an expert in their application. It will be noticed that the definition of descriptive statistics is very similar to the definition of management accountancy: both are concerned with the collection, interpretation and presentation of data, though the management accountant limits himself to business data and is more concerned with their practical usefulness than with the theory.

1.5 OFFICE ORGANISATION, METHODS AND EQUIPMENT

This is also called office O & M (Organisation and Methods, a British term) or clerical work study.

It is the body of techniques and practical knowledge by which information is provided in the right form at the right time to the right person. This includes such organisational matters as the division of work, delegation of authority, line of authority, span of control, functional organisation and centralisation/decentralisation, and such methods matters as the sequence of work steps, simplification, office layout, communication of information by forms, by telephone, and face to face, form design, use of add-listing machines, typewriters, calculators, accounting machines, pegboards, copiers, duplicators, addressing machines, and other equipment, and methods of recording, sorting, analysing, summarising and filing.

The purpose of O & M is closely related to the purpose of management accounting, but two useful distinctions may be drawn:

(i) the O & M specialist uses his technical knowhow on clerical procedures, work measurement, form design and office equipment in order to design standard procedures or systems by which data is collected, and processed into the required information at minimum overall cost. The management accountant is more concerned with the information itself, and its interpretation to management, than in the means by which it is assembled;

(ii) whereas the O & M procedure provides for planned reports, e.g. monthly reporting of product costs and sales revenues, the management accountant has to use his initiative in obtaining information for special or ad hoc reports.

A management accountant may, of course, be trained in O & M. After financial and cost accounting, this is the most useful string to his bow. The definition of management accounting services includes "office organisation, methods and equipment". In this text the subject is limited to accounting systems and procedures. (See Section 8).

1.6 ELECTRONIC DATA PROCESSING (E.D.P.)

Often called "automatic data processing" (ADP) or "computers." "Data processing" is not strictly the same; it is a general term for any addition, calculation, analysis, transfer or other re-arrangement of data, and includes simple manual processing, and various means of mechanised processing.

Whereas O & M included the use of office equipment, generally EDP (or ADP) deals with the use of electronic computers. The same principles apply as before, viz. the provision of relevant information at the right time to the right person, at the lowest overall cost. Therefore the management accountant is as interested in EDP, and its possibilities for providing planned information, as in O & M. As before, this is a distinct specialisation which the management accountant may or may not have. (See section 8.24).

1.7 OPERATIONS RESEARCH (O.R.)

Operations research is the scientific approach to solving problems. O. R. practitioners measure the basic elements in a problem in quantitative terms, and seek their relationships. From this a model of the real situation is constructed, often in terms of equations or numerical diagrams. The solution can then be found by trial-and-error on the model, or by mathematical analysis.

Particular O.R. techniques have been developed which apply to particular types of problem, e.g.

(i) Linear programming which shows how to allocate limited resources of staff, money, space, equipment, etc. so as to maximise profit, or to carry out a program of work (which can be done in a number of different ways) at least cost. A common example of this is known as the transportation problem; how to employ a fleet of vehicles to carry goods from a number of supply points to a number of distribution points at minimum cost. Another example is how to mix various raw materials to form a product having certain required characteristics, at lowest unit cost. Another is how to allocate land and labour on a farm which can produce various products. (See Section 4, Appendix 2).

- (ii) Queueing theory is used in problems in which waiting periods are involved, e.g. how many telephone lines should be provided into the Head Office (given the frequency and length of calls at different times of day, and the maximum time that anyone should have to wait to get through), or how many pumps in a petrol filling station, or how frequently to give machinery a preventive maintenance check, or how many counters in a bank or government department dealing with the public.
- (iii) Inventory control. A number of models have been developed for keeping stocks to a minimum while not holding up production or sales. Some models assume that stocks are issued at an even rate; others allow for uneven demand, seasonal peaks, etc. (See section 6.12).
- (iv) Network analysis, critical path method (CPM) and programme evaluation and review technique (PERT). These are all methods of planning and controlling the progress of a large or complex project, so as to ensure completion by the required date (or as soon as possible) and at minimum cost. The project is analysed into its component activities and events, which are plotted on a network diagram or bar chart, which shows which activities must be completed before other activities can start. The project may be a large scale project such as the Polaris project (an early success in the use of PERT), a building or construction project, or an administrative project such as moving into new offices, starting a factory, installing a computer, or carrying out an audit.
- (v) Discounted cash flow is sometimes included as an O.R. technique. This is concerned with investment models. All investment has the characteristic that outlays are made before benefits are received. The timing of outlays and benefits is as important as their size. This is of fundamental importance to the management accountant, and is fully covered in Section 3.
- (vi) Games theory is concerned with determining the best strategies in competitive situations. It has found practical application so far in marketing strategies for pricing, tendering and advertising.

Management accountants are not usually O.R. specialists though they should understand its uses and limitations, so that they can call on O.R. specialists when appropriate, and understand their language.

In many large firms, management accountants, computer experts and O.R. men are combined under the heading Management Services or Information Services.

1.8 SYSTEMS ANALYSIS (AND SYSTEMS DESIGN)

This is a general term for systematic investigation of work or problems. It includes work study, data processing, and operations

research. The term is often limited to the analysis and design of information systems based on computers.

1.9 INTERNAL AUDIT

The older and narrower concept of internal audit was auditing the financial records of a business, and participating in the design of accounting systems by which such records were produced, in order to prevent and detect errors and fraud. The internal auditor was the outside auditor's "contact man" and existed for basically the same purpose as the outside auditor, viz. to increase the accuracy and reliability of the final accounts for the benefit of owners (shareholders) and creditors.

The modern concept of internal audit is that it is primarily a service to management, particularly in their internal control responsibilities. Internal audit is therefore concerned also with matters of efficiency, value for money, etc. It has been defined as the prevention and detection of fraud, error and waste (all of which reduce the efficiency of the firm.)

The internal auditor has to be made independent of both those who have custody of assets (cashier, storekeeper, plant foremen, gatekeepers, etc.) and also of those who record the transactions in the books (or who have access to the books), since he is checking both.

The management accountant should not also be responsible for internal audit. He will, of course, be in close touch with the internal auditor particularly when information systems are being designed or altered.

1.10 MANAGEMENT AUDIT

This is sometimes identified with internal audit. More broadly, it has been defined as "the systematic assessment of standards and techniques of management". This would include utilisation of personnel, career development, staff morale, whether planning is systematic or ad hoc, comparison of objectives with achievements, work standards, financial efficiency and performance, and whether full use is made of advisory services and consultants.

1.11 FINANCIAL MANAGEMENT

Financial management is management of the financial resource, just as personnel management is management of the personnel resource.

The financial resource is money or, a wider term, funds. The financial manager, in conjunction with other functions such as production and marketing, plans the need for funds, raises funds, allocates (deploys) funds to investments within the firm, controls the use of funds, and repays funds (dividends, taxes, repayment of loans, etc.). He is also concerned with occasional problems such as merger with another firm (an outside investment of funds, usually combined with raising additional funds), and liquidation (final repayment of funds). Financial management may be divided into eight phases as follows:

- (i) Planning the need for funds;
- (ii) Programming the need for funds over a period of time;
- (iii) Budgeting the use of funds by the various products and activities of the business;
- (iv) Funding, i.e. obtaining funds for the above;
- (v) Accounting for the use of funds;
- (vi) Reporting to management on the use of funds;
- (vii) Evaluation of the use of funds in relation to the objectives of the business;
- (viii) Audit after the event, independently of management, on how owners' and creditors' funds have been used.

How does financial management compare with management accountancy?

If financial management is management of the financial resource, management accountancy may be described as management of the information resource. Since money is "the language of business" there is a considerable potential overlap. In a small organisation, both functions are usually combined in one man.

1.12 THE ROLE AND POSITION OF THE MANAGEMENT ACCOUNTANT IN THE ORGANISATION

The primary role of the management accountant is contained in the definition of management accountancy as the provision of information by which managers manage. The management accountant identifies information needs, researches data sources, organises and supervises the translation of data into useful information, and interprets it to management.

His responsibility is not limited to passing on information obtained from others. He is an editor, not a postbox. His information will not be of much value (and his job may not survive long) if he accepts the first estimates he is given without critical enquiry, or if he fails to apply available checks and controls to check the accuracy and validity of his figures. The real skill in management accounting comes in this feel for figures; experience enables him to spot errors, over-optimistic forecasts, omitted costs, as though they were written in red ink. To every figure there is a probability or risk factor attached; the management accountant's job includes assessing and reporting risk.

Some management accountants always quote their sources of information. This may be useful to the recipient in assessing its reliability, but does not absolve the management accountant from the need for care.

The management accountant is also presumed to be an expert in financial objectives and policies and has a responsibility for ensuring that they are clearly formulated by top management and disseminated

throughout the organisation. In the financial evaluation of any proposed expenditure or course of action, he will include a recommendation based on whether the proposal will result in higher profits, acceptable risk and adequate liquidity (in a profit-seeking organisation) or whether some alternative or modified proposal would better achieve the financial objectives. In general he will promote cost consciousness and financial efficiency, as contrasted with consciousness of purely departmental objectives and technical efficiency.

The management accountant in his advisory capacity may find himself in the position of co-ordinator in planning, programming and budgeting activities. This is due to his central position, his status, and above all to the comprehensive nature of financial evaluation. All aspects of a proposal have financial consequences which must be translated into financial terms, and summarised in a single office. The management accountant must ensure that all parts of a plan or project are based on the same assumptions and are properly co-ordinated. If a plan or project must be approved by a certain time, the management accountant is often responsible for preparing an evaluation timetable and ensuring that all functions of the organisation concerned with the plan or project provide forecasts, evaluations, assessments, etc. to the timetable.

The management accountant is a staff manager rather than a line manager, that is, his responsibility is to advise rather than execute. He may of course have his own department and full line management responsibilities towards his own staff, but with regard to the rest of the organisation he has a staff or advisory role. The American term Controller is a misnomer. Strictly speaking, the accountant does not himself control: he provides the means by which line managers may control, since it is each manager's responsibility to control his own operations.

In practice this staff/line distinction breaks down in a number of ways:

- (i) as a senior manager with financial expertise he naturally participates as a member of a team in top level policy formulation and in planning programming and budgeting at various levels.
- (ii) in particular areas, his "advice" may be tantamount to executive command. This can arise by express delegation of authority from the managing director, or by implied delegation where the managing director has confidence in his judgement and does not overrule him. It can of course also arise as a dereliction of authority where the managing director cannot or will not make decisions.

The position of the management accountant in the organisational framework varies widely according to the size and type of business, and the competence and personality of the officer concerned. It may be said that he should not be subordinate to the financial accountant since the main purpose of keeping the books of account is today seen as providing information to management. The accounting system must be geared first to management needs, via the management accountant. The financial accountant must then ensure that external reporting needs

are also met. Very often the management accountant reports directly to the Managing Director. In a large organisation he may report through a Controller or Finance Director. (See section 8.27).

There is no doubt that, today, industry and commerce recognise the contribution of the management accountant. Anthony Sampson in "Anatomy of Britain" wrote: "The accountants, the fastest growing profession in Britain, stand to the world of corporate business much as the lawyers stood to the 19th century world of rich men's property. They are the priesthood of industry."

With the rapid development of management information systems, based on the theory of communication and control in systems (cybernetics), and the simultaneous advent of sophisticated communications and control equipment (computers), the future role of the management accountant is likely to change rapidly. There does not appear to be any doubt that the management accountant will be an even more essential and central figure in the organisation of the future, though it is as well to keep an open mind on the precise nature of the part he will play.

1.13 ECONOMIC SIGNIFICANCE OF MANAGEMENT ACCOUNTANCY

The main concern of economics is how to allocate limited resources so as to satisfy unlimited needs and desires. This imbalance of resources and needs is particularly acute in developing economies where the revolution of rising expectations has advanced further than the managerial and technological revolution. Not only is there a general limitation of resources, but some are in especially short supply, notably foreign exchange, risk capital, and skilled manpower. The problem is compounded by population increases.

The role of the private sector is essentially the same as that of the public sector. Both exist to promote economic and social development by turning raw resources into the goods and services which go into the national product, and so into the standard of living. In the private sector, national product is represented by value added, that is, the excess of revenue from the sale of goods and services over the cost of raw materials and purchased services. This is identically equal to the national income, which is represented by wages and salaries, rent, interest and profits. From a social accounting point of view the profit and loss account might be set out as follows:—

Wages and salaries Rent Interest Profits Sales, less cost of materials and services purchased

From this it can be seen that, in total, higher profits mean higher national income and national product unless they are at the expense

of other incomes. It can generally be said that an enterprise which seeks to maximise profit is also a national income-seeking enterprise.

The management accountant, therefore, in advising management on how to reduce costs and waste and increase efficiency and profits, need not feel that this is a purely private activity, unrelated to his country's economic growth, or to the fight against poverty and want. He is in the front line of this battle, whether he realises it or not.

Accountancy may be regarded as the administrative side of economics, as defined above. Conventional enterprise accounting provides data for decisions on the allocation of resources within the organisation. This is also called micro-economics. Social accounting is a recent development which aims to aggregate the separate accounts of the government, public enterprises, private enterprises, households and individuals, into accounts for the whole economy. This is the macro-economic aspect.

The aspect of accountancy which is most important to the economic development process is management accountancy, since this is the area most concerned with the sound formulation, evaluation and implementation of projects and programs, which have been called the "building blocks" of the economy. Development emerges from a series of resource allocation decisions on whether project benefits will exceed costs. It is not a matter, for instance, of capital formation per se but of profitable capital formation. Neither is economic development necessarily served by industrialisation, or by using equipment and techniques that are the most modern and advanced in terms of more industrialised economies; often financial and economic evaluation will show that less capital-intensive techniques are more profitable.

Economic development is today's imperative and it is relevant to ask what contribution is made by accountants, by accounting systems, and by their concepts, methods and techniques. Unfortunately, in most developing countries accountancy is still not viewed as a management tool, let alone a tool of economic progress. Yet this is its ultimate purpose.

1.14 QUALITIES REQUIRED OF THE MANAGEMENT ACCOUNTANT

There has been a lot of criticism of the negative attitude often shown by the more traditional type of accountant who is more concerned to minimise risk, or if possible avoid it altogether, than to take the calculated risks on which profits depend. It is unfortunately true that a training based largely on auditing often results in an over-cautious attitude to innovation and risk, and a pedantic emphasis on accuracy which is not required for managerial decision-making. However, the management accountant provides an independent and objective check on ideas and projects. No-one is so biased in favour of a project as the man who first thought of it, so the accountant's impartiality is often a necessary corrective.

The old-style accountant only moved between the accounts department and the managing director's office. The management accountant, on the other hand, actively seeks out the reality underlying his figures and is as likely to be found in the stores, or on the shop floor, or visiting branches in the field, as in his office. A necessary quality in the management accountant is initiative. He must be a self-starter as often there is no established pattern of work to be done, as in financial accounting. His job is mainly what he makes it. In the public service especially, the accountant has been content to play the part of "recording angel", and has neglected his creative role. His low status, compared with other professional groups, is a consequence.

Needless to say, the management accountant must be numerate. He must be accustomed to translating figures of speech into figures of arithmetic and setting off advantages against disadvantages in quantitative terms. Contrary to popular opinion, this does not require advanced mathematics; simple arithmetic and percentages are sufficient most of the time. However, the accountant of the future will certainly require more mathematics in order to use the statistical, operations research, and data processing techniques now at his disposal. With modern methods of teaching mathematics it is reasonable to expect tomorrow's accountant to be familiar with advanced mathematics up to and including calculus, matrix algebra and set theory.

The management accountant is a member of a team, not a back-room boffin. He must therefore also be a good communicator, both orally and in writing. He must be sufficiently easy in his personal relationships that he can understand and be understood at all levels. It is unfortunate that management accountancy, like all specialised subjects, has its own jargon such as "variance analysis", "corrective action", "present value", "limiting factors", "responsibility centres" and so on. A good management accountant, it may be suggested, is one who does not need the jargon to defend his specialisation.

A complicating factor is the old concept of the accountant as controller in the negative and punitive sense. This type of control sets up defence reactions which may in fact reduce overall efficiency and productivity. A lot of research is now being conducted into the effect of different styles of management, and the picture emerging is that the older form of organisation based on hierarchical authority is not so efficient (nor so pleasant to work in) as one based on participative management. For instance, it was long assumed that money is the key to motivation and that a system of payment by results was bound to raise productivity. This theory was contradicted by the widespread finding that workers limited their output to group-accepted norms, even at the cost of reduced pay. Some companies now collect not only technical and financial data on their performance, but also behavioural data on such variables as perception of goals, levels of aspiration and group cohesiveness.

The management accountant cannot be as familiar with the behavioural sciences as with quantitative techniques, but he must understand

their importance, so that in designing control procedures and in budget administration, he is aware of (and can question) the underlying motivational assumptions.

Financial systems are information systems and it is likely that accountancy will be taught and understood in the future as part of systems theory. The statutory roots of accountancy make it appear different, but functionally the accountant exists only to provide information within the systems and sub-systems of the organisation and its environment. This makes life very challenging for the accountant of today. A revolution is in progress on a number of levels. On the surface, computers are changing the appearance of the office out of all recognition. At the same time accountants are reorienting themselves to their new role. From being historically minded, they are switching to being forward minded. From seeing accounts as material for audit, they are now organising accounts as tools of management also. At the deepest level, accountancy is embraced by systems theory, which draws on both the physical and behavioural sciences. Accountants must measure up to these new concepts and techniques; they will take them over, or be overtaken.

TYPICAL EXAMINATION QUESTIONS

- 1. You have been recommended as prospective financial adviser to a small but fast-growing company. At the interview the Managing Director an inventive engineer remarks "insofar as accountants are known to make decisions, they are liable to say 'No'." How would you answer this expression of opinion? (ICA Final 5/68).
- 2. Discuss the role of the management accountant, and the function of management accountancy, in a non-profit making organisation. In particular, comment on the type of objective which can be established where the profit motive is absent. (ACCA Final 12/67).
- 3. The main function of accounting is to record, summarise and report various business facts. To do this requires a measurement of these facts and an accounting measurement, like most others, is an approximation not a precisely accurate statement. Why are accounting figures approximations? Give examples of three items which appear in the published accounts of a limited company and which are approximations. What basic requirements of a management accounting system add to the degree of approximation in accounting figures? (ACCA Final 6/66).
- 4. A Financial Director has been appointed by a large manufacturing company with a large variety of products. What qualities of skill and judgement would the Financial Director require i the case of such an appointment? (ACCA Final 12/67).
- 5. Operational research is a generic name for a group of techniques, some of which are of considerable interest to the management accountant. Name four examples of these techniques and describe the type of problem in which they might be used. (DPFM 12/68).
- 6. (a) Give a brief definition of work study.
 - (b) Specify and write a brief note on each of its main divisions and in respect of each tabulate the production benefits sought. (ICWA II 12/67).

SUGGESTED ANSWERS

- 1. In the context of a job interview it would be wise for the accountant to express himself with care, but the following points should be made:
 - (i) The accountant specialises in seeing all aspects of a proposal in the common denominator of the firm's profit objective. He is often thought to be a No-man by functional executives because they see a proposal only from their own angles and not in total.
 - (ii) Often a proposal is good but the business simply does not have and cannot get funds for it. This does not make the accountant popular either but has saved many businesses from bankruptcy.
 - (iii) Accountants are trained to be careful and not make hasty decisions.
 - (iv) Strictly speaking the accountant offers opinions, not decisions.
 - (v) The accountant has various other functions apart from offering advice on proposals such as obtaining finance and setting up information systems on costs and revenue.
- 2. The role of the management accountant depends upon the policies and objectives of the organisation, in particular the financial policies and objectives.

In a non-profitmaking organisation, the objective is usually to avoid losses as well as profits, i.e. to break even. Also small profits and losses may be ignored in particular years, provided that the organisation breaks even in the long run. Many charities, clubs, schools, social service organisations, government bodies and other institutions work on this principle.

The management accountant helps to achieve this objective:

- (i) by providing planning information and advice on how to equalise costs and revenues.
- (ii) by analysing the costs and revenues over the different products and services provided by the organisation, so as to reveal which make losses, and which make profits.
- (iii) by advising on the prices of products and services so as to equalise costs and revenues or to allow cross-subsidisation according to policy.
- (iv) by setting up control systems by which the plans may be achieved.

Even in a non-profitmaking institution, it is important to reduce costs, eliminate waste, and improve efficiency. The management accountant should use the various techniques at his disposal for enabling management to achieve the objectives of the organisation at lowest cost, such as standard costing, budgetary control, progress control, variance analysis, reporting by exception, and cost effectiveness (cost-benefit analysis).

- 3. Accounting figures are supposed to represent the real world of economic values. However, in several respects they present a distorted picture of the reality or only an approximation to reality:
 - (i) the fixed assets in the Balance Sheet are not shown at their true value, either to the firm or on the market; they are shown according to a pre-determined formula which is applied consistently, i.e. irrespective of reality; correspondingly, depreciation charged in the Profit and Loss account is not equal to the decline in real value of the assets except as a coincidence.
 - (ii) asset values and profits tend to be under-stated in accordance with the principle of conservatism.
 - (iii) the value placed on stock is very dependent on how much effort goes into identifying obsolete, surplus and damaged stock.
 - (iv) the value placed on debtors depends on subjective opinions about the future probability of bad debts.
 - (v) the provisions and liabilities brought to account depend also on subjective opinions about the possibility of losses in the future; various liabilities have to be estimated in advance.
 - (vi) where costs are attached to products, costs which are common to two or more products must be apportioned; the basis of apportionment is often more a matter of convenience than of real significance.
 - (vii) fixed costs are sometimes charged in the Profit and Loss account for the period they refer to; sometimes a portion of the fixed costs is included in the closing stock valuation and carried forward, thus increasing the apparent profit.
 - (viii) where data processing is done by clerks the human factor applies, especially where standard procedures have not been laid down, or where the quality of staff is low or where work is rushed e.g. an end-of-year stock check is not likely to be accurate.
 - (ix) all costs, revenues, assets and liabilities are measured in terms of rupees but the value of the rupee is constantly changing; its purchasing power falls as prices rise.
 - The basic requirements of a management accounting system are that the system should provide significant information at the right time to all levels of management. This requires an entirely different kind of approximation to the unavoidable approximations above. Figures are not reported down to the last cent because management are not concerned with cents. Only significant digits are reported i.e. digits which are significant for management decision-making. Usually a .1% accuracy is more than enough i.e. a production cost of Rs. 73,521/40 would be reported as Rs. 73,500, or even as Rs. 73,000. This often saves valuable time in getting out vital control information. Planning and control require speed rather than accuracy. What is required

is prompt and relevant information and not a degree of accuracy which is redundant to the purpose of the information. This means that the management accountant must concentrate on the *purpose* for which his figures are required and the *time* by which they are required.

- 4. A Financial Director is a senior manager and must therefore show qualities and skills rather different from what would be required of an accountant-technician:
 - (i) he must be a skilled communicator since he must understand and be understood by his colleagues with whom he participates in formulating policy and objectives. Also he is primarily responsible for disseminating agreed financial objectives throughout the organisation. For instance, the promotion of cost consciousness is his responsibility.
 - (ii) he must have an intimate knowledge of the firm's markets (both buying and selling) (not just the finance market), of the capabilities of executives throughout the firm (not just his own staff), and of the production, selling and distribution systems of the firm (not just the accounting systems). This intimate knowledge, backed with common sense, gives him a feel for possibilities and probabilities. He is then said to have judgement, "business acumen" or "flair".
 - (iii) he must have a positive attitude towards risk and not merely seek to avoid it. Where the potential rewards make the risk worthwhile, he must have the courage to make decisions and to go on making decisions not even knowing whether earlier decisions were correct.
 - (iv) he must be able to take a long term view of the firm, to see its past and present position and to foresee its probable development as a continuing process.
- 5. Four examples of O. R. techniques are as follows:
 - (i) Linear programming is a technique which indicates how resources should be best allocated to achieve a specified objective.

For instance, if resources of men, materials, machine-hours, etc. are limited, but may be allocated to the various production lines of the organisation in different ways, LP shows which way produces highest profit or which way will make maximum use of scarce resources. When the resources are given the aim is usually to maximise profit.

LP also indicates the best way to allocate resources to achieve a given (limited) objective. For instance, if goods are to be transported from a number of supply points to a number of demand points, and this can be done in an infinite number of ways, LP can show which way is cheapest. When the objective is given, the aim is usually to minimise cost.

LP can be applied whenever the problem can be specified in quantitative terms and where all quantities are *linear* i.e. costs are proportional to the amount of factor input and profits (or contributions) are proportional to the product output.

To the management accountant, LP is a planning and budgeting tool. Where there are two or more principal budget factors, LP indicates the production/sales program which will make best use of these scarce factors. It shows which program will make highest profit. If policy considerations prevent the organisation adopting the "best" program, LP shows the cost of such policy. Management can then rationally balance one objective against another.

The Simplex technique is especially significant to the management accountant as it shows also the premium value (excess of opportunity cost over paid out cost, "shadow price", "accounting price") of each scarce resource. This premium value is the extra profit the organisation would make if it had one more unit of that resource. The management accountant can then advise management on the profit value of breaking resource bottlenecks. For instance, it may appear prohibitively expensive to buy extra materials during a shortage; however the management accountant may show that such prices are still below the true profit value of extra materials to the organisation.

(ii) Inventory models are used by the purchasing function to find out the optimum order quantity and timing. The more that is ordered at a time, the fewer orders have to be placed in any given year. However, the more that is ordered at a time the higher the average level of stock; this ties up scarce capital and raises interest and other costs. The economic order quantity minimises all these associated costs. It depends on the cost per order, the costs of holding additional stock, discounts available on bulk purchases, expected price movements, the pattern of demand over the year, physical storage capacity, etc.

Inventory models are also used by Production Control to determine the optimum lot size and timing. The longer a production run, the less the setting-up costs in any given year. On the other hand long runs increase the average finished goods on hand. As before, a balance can be struck which minimises the total of all costs affected.

(iii) Network analysis is used in planning and controlling projects or major activities which comprise many separate jobs or subactivities. Each job can only be started on completion of other jobs: this necessary sequence is set down graphically. Jobs can then be seen to be critical or non-critical. A critical job is one which affects the overall time to complete the project, i.e. it is worth detailed examination. A non-critical job is one

that runs parallel to critical jobs and can be done at any time within certain limits (float) without affecting overall completion time.

This technique may be used on all construction projects, on batch production planning and control, on administrative projects like carrying out an audit, moving office or installing a computer, on marketing projects such as publicity campaigns and market research surveys, on research and development projects, etc. etc.

(iv) Queueing theory is used to determine the facilities required to provide a certain service at minimum cost, including the cost of waiting for service, e.g. the number of sales staff to provide in a shop. At one extreme one or two salesmen could attend to all customers provided they were prepared to wait. At the other extreme, the staff and counter space can be expanded so that no-one should ever have to wait, even at peak hours. Obviously the optimum number of staff lies somewhere between the two extremes.

Typical applications are determining the number of maintenance engineers to repair plant and machinery, the number of vehicles for passenger or goods carriage, the number of service counters or staff in a service activity such as a barber shop or tourist agency or accounting firm.

- 6. (a) Work study consists of method study and work measurement. Some writers include also organisational analysis.
 - (b) Method study is the systematic investigation of work methods (who does what, where, when and how?) with the aim of finding methods which produce the same output with less resources or higher output with the same resources.

Work measurement is the measurement of the work content of standardised methods as a basis for planning (budgeting, personnel recruitment, production planning), and control. It may also be used as a basis for remunerating labour (incentive pay systems in which pay is based on the work content of output).

The production benefits sought are as follows:

Method Study

Higher labour productivity
Lower material usage
Lower usage of plant services
such as maintenance
Better layout of plant & work stations
Lower product unit cost
Higher quality
Reduction of fatigue
Better working conditions.

Work Measurement

Better planning and control Higher morale by equitable pay systems Standards for training new workers.

SECTION II

FINANCIAL OBJECTIVES

2.1 PROFIT

The primary financial objective of a private enterprise is private profit. Profit is the difference between revenue realised and the costs incurred to achieve that revenue, according to accepted accounting rules.

The primary financial objective of a public enterprise is public profit. This is the difference between social benefits and social costs. Social benefits are economic benefits of any kind accruing to anyone within the economy; social costs are economic costs of any kind whoever within the economy suffers them.

The rest of this section is concerned only with private enterprise, though most of it can be applied, mutatis mutandis, to public enterprise also.

2.2 HOW MUCH PROFIT?

Profit is required for three purposes

- (i) to remunerate risk capital
- (ii) to provide funds for maintenance of capital during inflation, and
- (iii) to provide funds for future modernisation and expansion (especially where the market for new capital is small or unreliable).

In the long term, the firm must make profit adequate for these purposes otherwise it cannot survive. Therefore, the amount of profit required should be calculated, then deliberately planned for and achieved. In any particular year, the profit may be higher or lower than average because of special conditions, but over a 5 year or 10 year period, aggregate profit must be adequate. If profit is left as a residual, i.e. something that may turn up with luck, it is just as likely not to be achieved, with vital consequences. Well-run companies come very close to achieving their planned profits.

(i) Risk capital consists of ordinary shares and preference shares. At present (1971) preference shares are paid 9-11% per annum on their market value, less $33\frac{1}{3}\%$ dividend tax. Ordinary shares are remunerated partly by dividend distributions, and partly by capital appreciation. The dividend yield may even be less than on preference shares if capital gains are high from ploughed-back profits and bonus issues. The total return should be significantly higher than the return to the preference shareholder, since it is paid last, and is therefore at highest risk. It is not possible to lay down a norm for all businesses since risk differences between firms are considerable, due not only to the nature of the business and its environment, but also to the degree of gearing in its financing

(see section 5.2). No figures are available in Ceylon though the Ceylon Association of Manufacturers has recommended to its members (October 1969) a return of 15% p.a. on all capital employed (equity capital and loan capital).

Analysis of American common stocks from 1919 – 1963 shows that the yield to stockholders (both dividends and capital gains) has been about 11% per annum in money terms or 9% in real terms. A similar analysis for the U. K. 1948 – 1962 showed 11-12% in money terms or $7\frac{1}{2} - 8\frac{1}{2}$ % in real terms. (See Merrett & Sykes. The Finance and Analysis of Capital Projects pp. 73/4)

Sometimes total profit required is expressed as a multiple of the dividend required, as an indication of how far profits must cover the dividend; a dividend cover of two is common. However this ignores the problem of separately estimating (ii) and (iii) below.

(ii) To maintain the purchasing power of the original capital, the firm must set aside out of profits sufficient to offset any increase in the general price level index. If equity capital is Rs. 100,000 and the index is expected to rise 3% in a year, the planned profit should include Rs. 3000 for maintenance of capital. If a firm also has loan capital, (strictly, speaking, if creditors, both short term and long term, exceed debtors and cash), the equity makes a real profit at the expense of the creditors, and this can be counted towards the above Rs. 3000. Planned profit may then be reduced accordingly. (See section 5.9 on accounting for changes in price levels).

In addition to maintaining the general purchasing power of its original capital, the firm may need to maintain its purchasing power over the particular machinery, equipment and other assets it uses. For instance imported machinery which cost Rs. 100/– before the 20% devaluation of 1967, and the introduction of the FEEC exchange rate in 1968 (now 55%), will now cost Rs. 186/- to replace (120x 155/100) (not so much if it is supplied by a country which also devalued, such as U. K.) even without any increase in the foreign price. Additional profits must be reserved year by year sufficient to replace such assets.

(iii) the amount of profit required for future modernisation and expansion depends very largely on the type of industry, the product, and the particular firm. A capital intensive industry or one with rapidly changing technology needs more capital than a labour intensive industry or one with static technology. A new product will require more capital than a well-established product that has already achieved market saturation. A thrusting firm with clear objectives and plans to meet them will need more than a "sleeping" firm.

Capital can of course be raised externally, but this costs more than retained profits because of the expenses of issue, and is less certain in an undeveloped capital market. Many companies therefore prefer to meet their capital needs internally as far as possible.

2.3 OTHER OBJECTIVES

Profit is never the only objective of private enterprises as the human beings that run them have a multiplicity of motives, goals and values. For instance, most businesses are run, not by their owners, but by directors and managers whose interests inevitably diverge from those of owner-shareholders in the direction of security, status, perquisites, etc. for themselves.

Business objectives generally include all or most of the following:

- (i) high profit (see sections 2.4-2.6)
- (ii) low risk (see section 2.7)
- (iii) liquidity (see section 2.8)
- (iv) stability of profits, i.e. avoiding excessive fluctuations
- (v) product reputation
- (vi) research and development of new products
- (vii) market share
- (viii) personnel development
 - (ix) good employee relations
 - (x) good customer relations
 - (xi) good supplier relations
- (xii) good public relations

financial objectives (the concern of the management accountant)

other objectives (the concern of other functions in the business)

While profit is usually described as the primary objective, it has to be remembered that shareholders are not the only people concerned with the fortunes of the firm. Employees and their unions, customers, suppliers, the government and public at large, are also participants with interests at stake, in some cases very much more at stake than shareholders. Company law does not yet recognise the social responsibilities of a business, but they are widely accepted today, particularly by the larger corporations. Management perform a balancing operation, promoting all the above objectives simultaneously, and reconciling them where they conflict, as they frequently do.

This consideration is sometimes seen in terms of long-run profits versus short-run profits. A management development training program for instance will visibly reduce profits in its first year. However, in the long run, it may be expected to raise profits significantly. It is sometimes argued that all the above objectives will similarly increase long-run profits, and that therefore long-run profit is the only true objective of a business. There are two objections to this theory. First it is seldom possible to identify and measure the profits resulting from policies and

programs benefitting employees etc. Conversely, it is seldom possible to measure the profits lost by failing to develop new products and processes, by pressurising employees, or by neglecting management development and staff training. This makes short term profit (visible profit) a very dangerous measure of success, since it may be achieved at the expense of the future prosperity of the business. Secondly, and more profoundly, there are many objectives which are regarded as valuable in themselves, independently of any financial value. For example, the health and safety of employees is of value whether or not it contributes to productivity. This may be extended to cover other human values.

The economic theory of the firm assumes that each firm aims only to maximise its profits. However this reflects only economic motivation and goals. The behavioural theory of the firm recognises also other individual and group needs and goals, such as stability and security, freedom from stress, acceptance by the community, status and esteem. Research surveys have shown that firms aim for "satisfactory" profits rather than maximum profits. If profits fall below the level considered satisfactory, the firm is very active in cutting costs, expanding sales, and seeking new markets. When profits recover, the profit drive fades. Higher profit is sought only if the cost in terms of other goals is not too high.

A further limitation on the profit objective is the cost of searching for more profitable opportunities. In any real situation a manager decides what to do on the basis of incomplete information. More information would allow him to make a better decision (more profit and/or less risk) but would cost time and money. In effect the manager balances the possibility of extra profit and less risk from more complete information with the cost of obtaining the further information.

Balancing and reconciling different objectives and interests is the responsibility of general management. The management accountant limits himself to the financial objectives. Thus he might say that a proposed price will increase profits by Rs. X, but it is for the Managing Director to weigh this against any disadvantageous effects. The management accountant is concerned primarily with pointing out how the profit cake can be made larger; not with its division.

2.4 PROFIT AND PROFITABILITY

The existence of a planned profit or satisfactory profit does not prevent the company aiming at improving on this target in any way it can, provided other objectives are not unduly prejudiced. This is expressed by saying that the firm ought to maximise its total profit other things being equal (which of course they never are in practice). This is total *net* profit, after meeting all costs and taxes. If the firm obtains capital from loans or debentures, it aims to maximise its equity profit after all interest payments, i.e. it is the final residue or surplus which is maximised. This surplus consists of revenue profits *and* capital profits. There is sometimes a tendency to play down capital profits but it may

be said that a rupee of capital profit is worth just as much as a rupee of revenue profit. Very often capital profits arise as windfall profits, i.e. unplanned profits on the sale of fixed assets. However there is no reason why they should not be planned for and sought as assiduously as any other profits.

Profit now is worth more than profit later as profit now (or more accurately cash now) can be invested and will amount to a higher sum later. Therefore, a firm should prefer, say, 100 now to 25 a year for 4 years or even 26 a year for 4 years. In order to compare two profit plans, cash flows in different years are put in the common denominator of their present values. If money costs 10% p.a. 26 next year has a present value of 26/1.10, or 23.6,26 in year 2 has a present value of

 $\frac{26}{1.10 \times 1.10}$, or 21.5. Similarly the 3rd year's 26 has a present value

of 19.5 and the last year's is worth 17.8. Total present value of the 4 x 26 profit plan is only 82.4, whereas 100 now has by definition a present value of 100. Thus, a better decision rule where consequences have a time dimension is to maximise, not equity profit, but the present value of equity profit.

This may be used as a criterion for deciding between different courses of action, such as whether or not to invest in new equipment, or what mix of products should go into the budget or what overtime policy should be. It is important to remember that this is only the *financial* evaluation (discussed in detail in section 3) and that other objectives give rise to other evaluations.

In certain circumstances, management should not necessarily prefer the course of action showing the higher profit:

(i) if one course of action involves using more capital than the other or capital for a longer period, then the firm should aim for higher *profitability*, not higher profit. A project that earns Rs. 10,000 profit in a year on assets of Rs. 100,000 (10% p.a.) is better than one that earns Rs. 12,000 on assets of Rs. 200,000 (6% p.a.)

The reason for this is not always clearly understood. Rs. 12,000 (after meeting interest costs) is better than Rs. 10,000 but the assumption is that capital is in limited supply and that the extra Rs. 100,000 in the larger project could earn more than Rs. 2000 in some future project. In effect, we prefer the higher profit expected in the long run to the immediately visible profit.

(ii) profitability is the ratio of profit over a period to one or more of the resources employed in making that profit. Capital is not the only scarce resource. In the short term of up to 6 months or a year, the firm may find for instance that it has insufficient machine capacity to make all the product it could sell. Even though capital is available, machine capacity may

be limited by the difficulties of import licensing, or the lead period for delivery.

In such circumstances, a project that earns Rs. 10,000 profit on 1000 machine hours (Rs. 10/- per machine hour) is better than one that earns Rs. 12,000 profit on 2000 machine hours (Rs. 6 per machine hour). This assumes that the extra 1000 hours could earn more than Rs. 2000 in some other use. If machine time is the most limiting factor or resource affecting profits, this is probably true. Notice that the profit is calculated in the normal way after charging the cost of machine time. mist would say "This is the paid-out cost. The opportunity cost of machine time is evidently higher." This is correct. If we know the opportunity cost of each resource and calculated profit after charging opportunity costs, we would be back to our simple decision rule: maximise absolute profit. In practice, opportunity costs are rarely known. Instead we charge paid-out costs, and then calculate the profit or contribution per unit of scarce resource (where there is one outstandingly scarce resource). By preferring those plans projects and policies that use this resource most efficiently, we maximise absolute profit in the long-run.

2.5 MEASURES OF PROFITABILITY

There are various measures of profitability or efficiency in the acquisition and use of resources, depending on which resource or combination of resources is being considered.

(i) Return on equity capital employed.

This is defined as:

Net profit after interest, tax and any preference dividend x 100 Ordinary share capital and reserves at current market values.

This base is equal to total assets at their current market values, less current liabilities, long term liabilities and any preference share capital. If the ordinary shares are quoted and the market is sufficiently active their market value may be used as the base. The return on equity capital is then the same as the earnings yield. Book values of assets are less reliable than market values for the following reasons:

- (a) capital appreciation is not usually recorded, so assets and capital reserves are often severely understated. A firm that appears to make 10% profit on property purchased many years ago for Rs. 100,000 is not doing very well if the current value of the property is in fact Rs. 500,000.
- (b) even without capital appreciation, it will be a coincidence if the book value of assets (cost less accumulated depreciation) corresponds with their market value. Goodwill for instance tends to be written off when the firm is making good profits, i.e. the book value of assets is reduced just when their market value has increased. Some firms develop

price indexes for their fixed assets so that current values can be quickly approximated by dividing by the index at the date of purchase and multiplying by the current index.

If market values or index values are not obtainable or if book values for any reason have to be used, it is wise to make some adjustments for the above factors. Fictitious assets such as preliminary expenses or debit balance on profit and loss account should of course be excluded. Intangible assets such as patents and trademarks are just as real as lease-holds and debtors and should be included, if possible at realistic market values. Goodwill on the other hand is best excluded, even though it is a real asset, because it represents capitalised "super-profits"; it is commonly calculated by capitalising expected profits at a "normal" rate of return, and deducting other assets at their book values. If all firms included goodwill on this formula they would all show the same rate of return (the "normal" return) on their total assets. This shows that comparisons between firms will be meaningful only if goodwill is excluded.

(ii) Return on total capital employed

Return on equity capital is a test of two aspects of management combined:

- (a) how well management have used the total funds at their disposal and
- (b) how well they have acquired loan funds at low rates of interest to the benefit of the equity.

If we want to measure only the efficiency with which the assets under management's control have been used to generate profit, and exclude any consideration of efficiency in financing those assets, the return on total capital employed should be calculated. This is given by:

Note that net profit before deducting interest is not usually shown on published accounts; the interest must be added back to the net profit after interest and tax.

The same remarks as before apply to the valuation of assets.

A problem arises if we are seeking to compare the return on capital for two firms, one of which owns its land, buildings or equipment, while the other rents or leases them.

Company A				Compa	any B		
Capital	1200	Owned assets	1200	Capital		Owned assets	200

NB. Company rents assets worth 1000 at 85/year

Net profit 120	Net profit 25
Return on total assets in Balance = $\frac{120}{1200}$ x $100 = 10\%$ Sheet	$\frac{25}{200} \times 100 = 12\frac{1}{2}\%$
Return on total assets owned = $\frac{120}{1200}$ x $100 = 10\%$ and hired	$\frac{25 + 85}{200 + 1000} \times 100 = 9\frac{1}{6}\%$

It can be seen that B is doing better on the assets appearing on its Balance Sheet, but this is due not to efficient operation (it is less profitable than A on its use of all the assets under its control), but to an efficient financing policy. (B pays only 85 on assets of 1000, i.e. $8\frac{1}{2}\%$, but uses the assets to earn $9\frac{1}{6}\%$. If A could sell 1000 of its assets and lease them back for 85/year, it would then be more profitable than B).

It is sometimes argued that assets should be taken at cost, without deducting depreciation, on the ground that if the firm makes the same net profit each year on a declining book value, it will appear to be getting more efficient each year. This ignores the fact that profits are earned, not only on the original asset, but also on the assets retained each year on account of depreciation of the original asset. If a business starts with capital of 100 and assets of 100, then makes a net profit of 10 after charging depreciation of 10, and distributes this as dividend its Balance Sheet will be as follows:

Capital	100	Assets at cost less depreciation		100 10
		Coch dobtors ato adde	d	90
		Cash, debtors etc. addeduring year	20	
		less dividend paid	10	10
	100			100

If the firm makes a net profit of 10 next year, this is 10 on 100, not 10 on 90, i.e. its profitability does not increase by taking assets at their written down values.

(iii) Return on net capital employed

Net capital employed means net of current liabilities, but without deducting long term liabilities such as debentures. Thus it is an intermediate base between equity capital and total capital. It is defined as:

Net profit after interest on short term liabilities and after tax, but before interest on long term liabilities.

Total assets at current market values, less current liabilities.

Note that in each of the ratios given, the appropriate profit figure includes the returns to the classes of capital included in the capital base, as follows:

PROFIT

Net profit before deducting interest and dividends

minus

short term interest

Net profit after short-term interest only

minus

long term interest

Net profit after all interest

minus preference dividend

Net profit after all interest and preference dividend

CAPITAL

Total capital employed (or total assets)

minus

short term liabilities

Net capital employed (or net assets)

minus

long term liabilities

Shareholder capital (or shareholders' assets)

minus

preference capital

Equity capital (or equity assets)

The arguments for preferring net capital employed to total capital employed are:

- (i) that creditors should be set off against debtors, since both are of a short term nature;
- (ii) that creditors should be set off against the stocks into which they have entered;
- (iii) that total capital employed suffers from fluctuations due partly to cycles of stock replenishment; net capital employed removes the fluctuations by setting off materials creditors against stocks.
- (iv) that only shareholder capital and long term loan capital are permanent.

The counter-arguments are:

- (i) management want to know how well they have used *all* the assets under their control; net assets omits some of the current assets which are as much part of the profit generating system as fixed assets;
- (ii) there is no more reason to set off creditors against the assets they have financed than to set off debentures against freehold property, or equity capital against other fixed assets;
- (iii) capital employed is not static and should not be expected to be so; for the purpose of calculating return on capital, an average figure over the period should be taken;
- (iv) stocks, debtors and cash are a permanent part of the business even though their value fluctuates.

Total capital employed appears to be more widely used in the U.S., and net capital employed more used in the British accounting tradition.

(iv) Return on operating assets

This is defined as:

Net operating profit, excluding other income

-- x 100

Fixed and current operating assets in use at market values

This is purely a test of how well management are using "operating assets". This term may be defined in any convenient way, but it excludes

- (i) assets not in use, such as assets under construction and assets out of action either temporarily due to breakdown or lack of demand, or permanently awaiting write-off.
- (ii) investments outside the business, such as trade investments, tax reserve certificates etc., and
- (iii) cash surplus to requirements.

Profit is usually taken before tax and excludes capital profits, special or non-recurrent losses, and income on investments.

This ratio should not be used as the *primary* test of general management as it omits a number of factors which are part of management's responsibility such as keeping assets in productive use, avoiding unremunerative cash balances, and investing so as to obtain maximum advantage from tax allowances (e.g. 100 profit less 50 tax is better than 110 profit less 70 tax).

However it is a very useful test of the efficiency of normal operations, and is often decentralised over the operating divisions of a firm. Each divisional manager's profit performance is measured by dividing the profit achieved by his division by the assets used to achieve those profits. When the ratio is used at divisional or lower levels, profit should in fairness be taken as the difference between revenue and costs controllable at that level without apportionments of head office costs and other uncontrollable costs.

(v) Discounted cash flow rate of return

Discounted cash flow (DCF) can be used to calculate the overall rate of return achieved by the firm, or the rate of return on capital invested in individual projects. The latter is basic to investment decisions and is described in section 3.

DCF is used for calculating the overall rate of return on total assets, net assets or equity assets (whichever base is preferred), usually over a period of years as it is essentially a *compound interest* rate of return. Over a one year period there is no difference between DCF and the methods described above.

The reason for using a compound basis is that profits retained in the business earn additional profits. A compound interest rate of return is therefore more accurate than a simple interest rate of return.

There is also an advantage in knowing the long-term average rate of return of the firm, because a short-term rate determined on any single year's profit is likely to be affected by special factors and accounting conventions.

The measurement of profits, and to some extent the measurement of capital employed, depends among other things on the amount of depreciation charged against the profit. Accounting conventions allow different methods of allocating a capital cost to the years that benefit. The method chosen must be used consistently each year, but nevertheless the amount of depreciation is fairly arbitrary. Therefore in any particular year, the profit may be higher or lower depending on the amount of depreciation charged, and return on capital employed by any of the above methods will vary similarly.

However, over the long term, the asset wears out or becomes obsolete, and is disposed of. At this point, any under – or over – depreciation in past years is corrected, and deducted or added to the profit in the year of disposal. Thus, at this point the *cumulative* profit over the years can be accurately assessed and compared with capital employed.

Only at ultimate liquidation of the firm will all the assets be disposed of and the final profit known, but it will be appreciated that, over a sufficiently long period, most assets will be disposed of and replaced thus correcting cumulative profits to a great extent.

Since profits are represented by additional assets, insofar as they are not paid out as dividends, etc., a convenient way of calculating the long term return is is to find the rate of profit which equates the opening assets with the assets at the end of the period. In the following example, allowance is made for dividends and additional capital introduced during the period.

Year	0	1	2	3	4	5	6	7	8	9	10
Opening Assets	1000										
Additional Capital Introduced						+ 200					
Dividends Paid		-50	-50	-50	-50	-50	-70	-70	-70	-70	-70
Closing Assets											1996

This firm has made 10% per annum compound on its assets over this period since, by trial and error, 10% addition to the assets held each year results in 1996 at the end of year 10:

	1	1	1	1				1505	1671	1771	1878
Opening Assets	-	1000	1050	1105	1165	1232	1505	1585	10/4	1771	1070
Profit	-	+100	+105	+110	+117	+123	+150	+159	+167	+177	+188
New Capital	-	-	-	-		+ 200		-	_	_	
Dividends	_	-50	-50			1	-70				
Closing Assets	1000	1050	1105	1165	1232	1505	1585	1674	1771	1878	1996
	1			1							

Note that the closing assets in Balance Sheets of intermediate years may be more or less than shown above because of depreciation and other such adjustments, and also because the profit may be more or less than 10% in individual years. The 10% p.a. is an average rate for the period, and includes both capital profits and revenue profits.

It is accurate insofar as assets have been disposed of and replaced (turned over) over the 10 years, i.e. insofar as it is freed from depreciation and asset valuation assumptions.

This long-term rate of return represents the firm's average profitability or "cost of capital" (see section 3.6)

(vi) Profit (or contribution) per unit of limiting factor

Capital is not the only scarce resource. Particularly in the short term of up to a year, other factors may limit the scale of production and sale even though capital is available. Raw materials may be absolutely limited by import quota or by delivery delays, similarly imported plant equipment or vehicles. Skilled labour in particular grades may limit production before any other factor. In competitive markets, sales volume may be the limiting factor. In these circumstances, attention should be paid to the efficient and profitable use of the most scarce factors.

To illustrate, suppose that funds are obtained by a large firm at 10% per annum, but that stock of an essential imported raw material is down to 500 lbs. and cannot be replenished for three months. How should the following alternatives be compared?

	A	В
Capital tied up Period Raw materials required Profit, net of interest	Rs. 30,000 3 months 500 lbs. Rs. 1,125	Rs. 20,000 3 months 500 lbs. Rs. 800
Return on capital p.a. (after interest)	15%	16%
Return on raw materials (rupees per lb.)	Rs. 2.25	Rs. 1.60

Absolute profit is higher in A, therefore A should be preferred to B, provided only that the capital difference of Rs. 10,000 cannot earn its interest plus Rs. 325 net profit in any alternative use. In this simple case raw materials usage is the same in both cases, so alternatives are

compared on absolute profit. If projects use different amounts of a limited resource, they can then be compared on return per unit of resource; this assumes that the balance of the resource will be used on other projects. Time, of course, is always absolutely limited, so the comparison must be on contribution per year, or other period (3 months in the above example) per unit of next limiting resource.

In general, where one factor is in short supply, and clearly shorter than other factors (i.e. in economic terms, its opportunity cost exceeds its paid out cost, or marginal revenue divided by marginal cost is more than one and higher than for other factors), then the highest profit is obtained by preferring projects, products, and policies which yield the highest annual return in terms of that factor.

Return on capital employed (annual profit per rupee of capital) may be seen to be a special case of this general rule. Return on capital, calculated on one of the above five methods, is widely recommended as the best test of overall efficiency of management. In the industrially advanced economies, this is usually true since capital is the only factor in limited supply certainly in the long term, and often enough in the short to medium term also. However in an economy in which physical shortages are endemic and persistent, care must be exercised in choosing an appropriate base for measures of efficiency. The maximisation of profit surplus is achieved by concentrating on products and services which show the highest annual profit (or contribution to profit) per unit of whatever input resource is in shortest supply. This may often be capital funds (especially if FEEC rates of exchange are substituted for physical controls on imports), but may instead be some physical resource.

If there is more than one limiting factor evident, the products (or policies) which make the best use of one factor may not be the same as those making best use of another factor. The best mix of products can then be found only by linear programming.

(vii) Profit on sales

This is either the gross profit margin $\left\{\frac{\text{gross profit}}{\text{sales revenue}}x\ 100\right\}$ or the

net profit margin $\left\{ \frac{\text{net profit}}{\text{sales revenue}} \times 100 \right\}$

The margin on sales is often quoted as a measure of profitability of a firm or of a particular line or product. It is in fact a measure of profitability not by reference to sales revenue, which is not an input resource, but by reference to the total cost. For instance, a net profit margin of 20% is another way of saying that the margin is 25% of total cost, viz.

Cost		80
Net profit	•••	20
Sales		100

Thus the profit margin expresses the profit per rupee of all resources. This is a good measure of profitability provided that no resource is more scarce than any other resource. This may sometimes be true in the short run, but in the long run, time and capital are the limiting factors.

The shortcomings of this ratio as a measure of profitability are shown in the following example. Firm A makes a profit of Rs. 20,000 on sales of Rs. 100,000 and appears to have a good 20% profit on sales, but if the sales were achieved on assets of Rs. 400,000 it has made only 5% a year on capital. Firm B makes a profit of Rs. 10,000 on sales of Rs. 100,000 and assets of Rs. 100,000, i.e. profit on sales is 10% and profit on capital is 10% a year. This is expressed by the formula:

 $\left\{ \frac{\text{Net profit x 100}}{\text{Sales revenue}} \right\} \times \frac{\text{Sales revenue}}{\text{Capital employed}} = \frac{\text{Net profit}}{\text{Capital employed}} \times 100$

(viii) Profit/volume ratio (P/V ratio)

This is defined by the following formula:

Sales revenue minus variable costs (= contribution) x 100

For a single product it can alternatively be calculated:

Selling price minus unit variable cost (= unit contribution) x 100

Selling price

It is very like the gross profit margin, is similarly used as a measure of product profitability, and has the same important limitation that time, capital employed, and any other scarce resources, are ignored. Suppose Product A sells for Rs. 100 and has variable costs Rs. 50, then its unit contribution is Rs. 50, and P/V ratio is 50%. Product B also sells for Rs. 100, but has variable costs Rs. 70; therefore its unit contribution is Rs. 30 and P/V ratio is 30%. Product A is produced at 100/month on capital of Rs. 100,000. Product B is produced at 400/month on capital of Rs. 100,000. Which is more profitable? Evidently B has the higher return per annum on capital, despite its lower P/V ratio.

If sales revenue is the limiting factor rather than capital or any physical resource i.e. if any amount can be produced but the firm is limited by the market demand, it might appear that the sales policy should be to push the sales of products that have higher P/V ratios even at the expense of those with lower P/V ratios. This is because the P/V ratio is the contribution per rupee of sales revenue. Great care must be exercised, however, for the following reasons:— (i) a product with a low P/V ratio may be redeemed by a high rate of turnover, and vice-versa. (ii) the policy is based on the assumption that sales demand is not specific to products, and that a decline in sales revenue from one product will be matched by an increased demand for other products, and (iii) the limiting factor may not be sales revenue, in fact, but some resource such as trained salesmen. In this case, salesmen should keep records of how much time they spend on each product, so that the management accountant can calculate each product's contribution per salesmanhour – a truer indicator of relative profitability.

2.6 PARTIAL FINANCIAL OBJECTIVES

- (a) A firm may aim to produce its product at minimum unit cost. This is a financial objective, but it ignores both revenue and capital and is therefore only a partial or "sub-optimal" objective. It is necessary not only to produce at low cost, but to do so at a good selling price, at high volume, and with minimum use of capital or other scarce resources.
- (b) Some firm appear to aim first for maximum revenue or maximum share of the market, subject to attaining a required minimum return on capital. It is necessary of course to add the profit requirement as not all sales revenue is profitable. If a profit is expected greater than the minimum required, the excess is spent on additional sales promotion, market research, etc. so as to improve future revenue. The danger of this policy is that the firm builds up no reserves beyond its foreseeable requirements. It may not survive an unforeseen depression, while its more profit conscious competitors live on their reserves until the market recovers.
 - (c) Another possible objective is maximum rate of growth of the firm. The size of the firm may be measured by its total assets, sales revenue, or employees. If the firm aims at rapid growth of sales revenue, this may be at the expense of profit, and is not worthwhile in the long run. Similarly, empire building irrespective of profit is unlikely to be successful in the long run.
 - (d) Maximising the total assets under the control of the firm is a much more attractive financial objective and needs closer analysis.

Total assets come from three sources: (i) new equity capital (ii) new debt capital (iii) retained profits and depreciation provisions. New equity capital can be raised only if the capital market has sufficient confidence in the firm's long run absolute profit surplus, so there is no conflict between the profit criterion and the maximisation of assets from this source.

New debt capital is a different matter. A firm can raise debentures and other loans so long as the lender believes that future profits will be sufficient to pay the interest and repay the principal. The equity shareholders benefit as they get the excess of extra profit from loan capital over the interest payable. But the more capital raised in this way, the more the equity profit fluctuates from year to year (see section 5.2 on gearing). Eventually equity shareholders get nervous; if the shares are quoted, over-gearing will reduce their price. Thus maximising assets from this source is still in line with the absolute profit criterion, but could make future equity issues difficult. Therefore a balance must be kept between equity and debt capital.

Retained profits and depreciation provisions are together maximised (i) by making maximum profit (after deducting depreciation) and (ii) by

distributing as little as possible. The latter will not of course be popular with shareholders and will drive down the value of their shares (making future equity issues difficult) or even lead to a replacement of the directors. Thus a policy of assets maximisation, or a maximisation of the rate of assets growth, fits more or less with the profit criterion, but taken to extremes can be self-defeating.

2.7 RISK

Higher profits can often be obtained by taking greater risks. Gem mining, for instance, is often more profitable than paddy farming, but is more likely to make losses. Similarly, within the firm, a project to manufacture and sell an entirely new product is more likely to fail than a project to expand a well-tried product, and would only be accepted if the profits looked sufficiently attractive.

Shareholders expect a return on their money comparable with what they would get from another firm at the same level of risk. Given the type of business, they expect management to invest in projects which will show a reasonable return without undue risk.

These terms are very imprecise. What return is reasonable and at what level of risk exactly? Unfortunately risk cannot be objectively measured.* It is possible, for instance, for a sales manager to assess the risk of failing to get an important sales contract at, say, 50: 50, and the potential project can be looked at in this light. But this remains a personal and subjective assessment. A more optimistic salesman might say 80: 20 in favour, and he cannot be proved wrong: if the contract is not signed, both forecasts allowed for the possibility of this.

Investments are sometimes classified according to the risk of not getting the expected returns, as judged from experience, as follows:

Highest risk — investments in pure research

- investments in known products not marketed by the firm, i.e. diversification
- investments in products already marketed by the firm, i.e. expansion
- cost-saving investments, where no new revenue is involved, e.g. mechanisation

Lowest risk — investments to save costs which are fixed by contract, e.g. purchasing a building to save known rent.

This broad classification does not necessarily reflect the risk inherent in particular cases. There are many other differences in risk.

^{*}Statisticians distinguish between risk and uncertainty. Risk is what is measurable from past experience, e.g. the risk of fire, flood, etc. Many risks can therefore be insured against by paying the appropriate premiums. Uncertainty is not measurable at all, and can never be insured against, e.g. uncertainty whether a new product will sell.

(i) investment in assets which have alternative uses is less risky than investment in, say, specialised plant; if the intended use fails, some returns may still be achieved by switching to the alternative use. Similarly, investment in assets that have a second-hand market, (such as land and buildings, quoted security ties, motor vehicles, and ships) is much less risky. If a taxi driver finds he cannot continue, he has not lost the whole cost of his taxi; he can recover its second-hand value. Since land usually maintains its value (at the very least) this is the least risky asset; its cost may be recovered in full on the termination of the project at any time. Investment in working capital is usually also recoverable at the termination of the project at any time, and is therefore at low risk. However, if a project is terminated prematurely because the product cannot be sold, the cost of the stock in hand will not necessarily be recovered. Debtors, of course, should always be recovered, subject to bad debts.

Specialised single purpose assets, and research and development expenditures such as market research, product development, personnel training and computer programming, are more risky than general purpose expenditures since if the benefits fail to materialise, there is usually no alternative but to write them off.

- (ii) risk depends also on the *time period* over which the costs are sunk until they are fully recovered, since over a longer period it is more likely that unforeseen events will intervene and prevent recovery;
- (iii) the risk depends also on how much relatively is at stake. A small firm might not take a risk of losing Rs. 50,000, with a 50:50 chance of making a profit of Rs. 200,000 whereas a larger firm would accept this, since it could absorb the possible loss more easily. This illustrates the principle of insurance. A large firm pools its risks in a large number of investments; losses which might be catastrophic to a smaller firm can be offset against the profits on other investments. Risk is reduced by insuring against the risk, that is, pooling with the similar risks of others, at the cost of the premium. The large company acts as its own insurer; instead of paying a premium on all its investments it pays the loss on the few that fail. (N.B. Most business risks will not be underwritten by an insurance company, as the probability of their occurrence cannot be ascertained from experience):
- (iv) the risk depends in many cases mainly on the *market* for the product, e.g. a market protected from foreign competition by a ban on imports or by high import duty is far less risky than one open to foreign competition.

2.8. LIQUIDITY

One of the financial manager's responsibilities is to see that there is always sufficient cash in the bank to pay bills as they become due. If there is not, the business is insolvent, and may do one of five things:

- (i) ask creditors to wait a bit longer (for which they may require tangible security)
- (ii) borrow elsewhere, if possible (a short term loan may be difficult to obtain or be charged a high rate of interest, if the firm has low liquidity, i.e. the firm has got into a vicious circle)
- (iii) sell assets, perhaps at a loss
- (iv) sell assets, and lease them back
- (v) sell all assets, i.e. go into liquidation.

This predicament can arise quite independently of profitability. The firm may be making large profits, and yet have them all tied up in stocks or debtors, and be short of cash. A boxer may be scoring points in every round but may be knocked out at any time; similarly, insolvency can happen to a firm that is trading well and increasing its profits year by year, unless it keeps a constant guard up by planning and controlling its cash outflows and inflows.

One of the commonest reasons for liquidation in prosperous firms is overtrading. This means increasing the scale of operations without sufficient working capital. More and more cash is spent on purchases or production, but cash is not recovered at the higher scale until stock has been sold, and debtors have paid. In the meantime the firm can become insolvent. This can be avoided by forecasting the need for additional finance and obtaining it in good time.

In many management decisions, the liquidity objective conflicts with the profitability objective and a balance must be struck. For instance, offering long credit terms to customers will often increase sales and profit, but reduces liquidity since debtors increase at the expense of cash. Also risk is increased, since customers asking for longer credit terms are less likely to pay.

Similarly, all long term investments are made in order to increase profitability, though they all reduce liquidity to the extent that cash is paid out before it starts flowing back.

TYPICAL EXAMINATION QUESTIONS

1. Return on capital employed is sometimes said to be useless as an indicator of performance (by private enterprise).

Do you agree? Give reasons for and against the use of such a ratio.

2. Profit is very often expressed for comparative purposes as a percentage of sales or of the cost of goods sold.

As management accountant of a long-established manufacturing company, enumerate the advantages and disadvantages of using capital employed for this purpose instead of sales or cost.

ICWA 12/60

- 3. Explain the difference between production and productivity. Outline a system of presenting figures to management to illustrate the productivity within a business consisting of three separate departments, and show clearly how comparison with expected productivity is illustrated.

 ICWA 12/60
- 4. Within a group of companies two factories are making similar (but not identical) products. A decision is to be made to standardise on one product line, to be made in one factory:
 - (a) What criteria would you use in reaching the most profitable decision for the group?
 - (b) To what extent do you consider that comparisons of "conversion cost per hour" and "added value per man" would assist this decision?

 ICWA V 12/67.
- 5. A company has the following capital structure:

0 " 1 05 11 1				Rs.
Ordinary shares of Rs. 1/- each: a	uthorise	ed, issued a	and	
fully paid - 4,000,000 shares	1.4	BOUND OF	1 10.00	4,000,000
7½ % cumulative preference shares	of Rs.	1/- each, fu	ally	
paid	moost	INTERNATION	213456	200,000
Reserves and undistributed profits		(Josephan	West. III	4,500,000
8% loan stock 1973/78				600,000

The company is paying bank interest, currently at 9 per cent per annum, on an overdraft which averages Rs. 1,000,000.

You are required to:

- (a) calculate the company's over-all required rate of return on capital employed, making such assumptions as you think appropriate;
- (b) state what yardsticks you would use in the evaluation of proposals for various categories of capital expenditure, so as to ensure that the required rate of return was achieved over-all.

Marks will be reserved for careful analysis of the factors involved, and clear presentation of your conclusions.

Adapted from ICWA V 12/67.

- 6. The board of the parent company of a large group of manufacturing companies has decided that, as a test of managerial efficiency, each subsidiary company of the group should aim to achieve an average annual rate of return on the net capital invested in it of not less than 12%, after income tax. This rate is to be calculated as the ratio of annual earnings to the value of resources at the beginning of each year.
 - (a) Explain briefly, with reasons, how, in calculating the ratio, you would deal with the following:
 - (i) the amount to be included for capitalised research and development expenditure;
 - (ii) the value of marketable securities included in the current assets;
 - (iii) changes in the general price level;
 - (iv) interest on debentures issued by a subsidiary.
 - (b) (i) What is the justification for using a ratio of this type as a criterion of managerial efficiency?
 - (ii) What principles do you think should have guided the directors in selecting 12% as the rate of return?

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7. It is recommended that profits and retained depreciation should be sufficient to finance the replacement of assets as this becomes necessary, to make a contribution towards growth, to provide adequate dividends on share capital and to cover taxation on these items so far as they are not allowable for tax purposes.

You are given the following information relating to the present position of the company:

Fixed assets at cost (repla	acement	value Rs.	175,000)	 100,000
Current assets (net)		• •	• •	 100,000
Total capital employed				 200,000
Represented by: Ordinary share capital				 80,000
Retained earnings				 120,000
				200,000

Average overall life of fixed assets: 25 years.

Target dividend on ordinary share capital: 15% (gross).

Target growth rate per annum in new capital investment in fixed assets (at replacement values): 3%.

Proportion of new capital investment to be financed out of retained earnings from current year's profits: 70%.

Rate of taxation: Corporation tax

Dividend tax

50%
33\frac{3}{3}\%

Lump sum depreciation allowance on capital cost of new assets: $66\frac{2}{3}\%$ On the basis recommended in the first sentence of this question state:

(a) the target profit before tax you would aim for in the year ahead;

(b) the rate of return it would represent on the total capital employed at the commencement of the year.

Adapted from ICWA V 6/67

8. A group holding company has several subsidiary companies manufacturing and selling electrical appliances.

Describe briefly the main ways of defining profit and capital employed for the purpose of comparing return on capital employed in each subsidiary and the factors involved in deciding which to use in practise.

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9. A holding company has decided to apply return on capital employed in assessing the performance of its Subsidiary Companies. However, to obtain realistic figures, certain adjustments, based on price level indices to book values, will have to be made.

From information relating to the subsidiary companies, A and B, you are required firstly to calculate:

- (i) the current (1970) replacement cost of the asset involved:
- (ii) the accumulated depreciation to 1970, assuming the asset to be reported at current value:
- (iii) the depreciation figure for the present year based on current values.

Secondly, using the calculated figures, you are required to state, with reasons, why you do/do not feel that in assessing capital employed, assets should be valued at current rather than historic cost.

		Subsidiary	Subsidiary
		Company A	Company B
		Asset	Asset
Year of Purchase		1940	1950
Purchase Price		Rs. 200,000	Rs. 550,000
Life		40 years	40 years
Disposable Value		Nil	Nil
Price Level Index at date of A	Acqui-		
sition		40	100
Price Level Index 1970		150	150
Depreciation Method		Straight Line	
		Adapted from	ACCA IV 6/66

SUGGESTED ANSWERS

- 1. Return on capital employed may be criticised as an indicator of performance of a private enterprise firm on the following grounds:
 - (i) There is no standardisation in the definition of "return" and still less agreement on what constitutes "capital employed". The return may be the net profit for the year before or after deducting tax, before or after overdraft interest, debenture interest etc., including or excluding non-trading income, capital profits, and exceptional or non-recurrent items. The capital employed may be the total assets, net assets (i.e. net of current liabilities) or equity assets (i.e. net of all liabilities) and may be at book values before or after depreciation or at estimated current market values.
 - (ii) The firm has objectives other than profit; for instance a reputable firm will include amongst its objectives and policies the maintenance of product quality, fair trading practices, employee satisfaction and development. In the short term, return on capital may be increased at the expense of other goals.
 - (iii) Also in the short term, conditions may not be controllable by the management; it is not always fair to judge management on a single year's return on capital employed, conversely a firm may appear to be doing well only because it has a monopoly (presumably temporary).
 - (iv) Absolute profit is the true goal, not return on capital employed. In the short term, physical resources may be more limited than capital funds; in these circumstances absolute profit is maximised by concentrating on return per unit of limiting factor rather than return on capital employed.

However, it will be seen that the criticisms are mainly against taking return on capital employed as a short term indicator of entire performance. In the long run, there is no other measure which gives such a comprehensive view of managerial economic performance. Probably the best measure of overall performance is the return on equity based on the market value of equity assets, as follows:

Net profit after tax, interest and preference dividend x 100 Total assets at market values, minus current and long term liabilities and preference shares.

This measures not only the efficiency of use of assets, but also financial gearing efficiency, and tax management efficiency. Assets are taken at realistic market values since book values are not values at all, but merely balances of original costs. Thus profit and assets are compared in terms of their current values.

2. Return on capital employed is better than percentage on sales or percentage on cost for the following reasons:

(i) if a product locks up large quantities of capital equipment in its manufacture, this will be revealed by a low return on capital e.g.

	Annual profit	Annual sales	Return on sales	Capital employed	Return on capital
Product A	10,000	100,000	10%	200,000	5% p.a.
В	8,000	100,000	8%	100,000	8% p.a.

(ii) If a product has an exceptionally long manufacturing cycle e.g. maturing timber, this is also shown up by a low return on capital e.g.

		Profit on one batch	Manuf. cycle	Ave. capital employed over manuf. cycle	Return on capital
Product	X	12,000	2 years	100,000	6% p.a.
	Y	10,000	1 year	100,000	10% p.a.

(A return on cost or on sales is a simple percentage, not a percentage per annum)

- (iii) For products which have different rates of turnover, the return on capital per annum gives due preference to products with high rates of turnover.
- (iv) If a product shows a low return on capital, steps may be taken to substitute more profitable products. If a product shows a low return on sales, however, this does not necessarily mean it is making a low return on capital. The latter should be measured before taking any action.
- (v) Low return on capital is often due to low utilisation of capital assets. This is not revealed by return on sales or on costs.
- 3. **Production** is simply output of finished goods or intermediate goods, either as a quantity or as a value in rupees.

Productivity is output per manhour, or some similar measure of output over input. Again it can be given as a quantity e.g. five chairs per hour, or as a value, e.g. Rs. 200/hour.

Productivity is a ratio which expresses efficiency, whereas production is an absolute quantity. In a capital intensive business productivity might be measured in terms of output per machine hour.

In a cycle factory, there are three production departments – Wheels, Frame and Final Assembly. Operations are standardised in each department so that all output (including intermediate output) can be measured in standard hours. The following labour efficiency report is compiled weekly by Costing Department and sent to the Departmental Managers and the actual productivity (production per labour hour) is compared with standard productivity and the variance analysed. Productivity lower than standard may be

due, inter alia, to excessive idle time, defective work, hold-up in materials, strike, etc.

Dept.	Prod'n	Prod'n per Lab. hour	Std. Prod'y	High or Low	Reasons
Wheels					
Frame					
Final Assembly					
TOTAL					

4. (a) The decision to standardise on one product line to be made in one factory should be based on *long term profit*. A discounted cash flow calculation will show which of the possible alternatives has the highest present value or terminal value, i.e. which decision will add most to the group's wealth in the foreseeable future.

For each product line, the calculation should be based on the realistic sales forecast going forward several years and current expenditure on production, selling, distribution and administration. Any sale proceeds from the other factory should be omitted from the calculation as this would in any case be receivable some day. Apart from this, all other receipts and payments consequent on the decision to standardise should be brought into the calculation.

(b) Conversion cost per hour presumably refers to the labour and overhead cost per hour of converting raw materials into finished goods. This is not a measure of profitability, productivity or of efficiency and should not be used to decide between the two factories. One factory may show a lower conversion cost per hour simply because it is smaller or because it uses lower grade labour, or fewer ancillary services, but its profitability (the final criterion) may be higher or lower.

"Added value per man" is taken as the difference between the sales value of production and the cost of materials and bought-in components, divided by the number of employees at each factory. This is a measure of labour efficiency rather than of overall profitability and should not be used as a criterion for decision.

5. (a) Required rate of return on capital

Remuneration of ordinary share capital and reserves: say 10% x 8,500,000 (Note 1) of which dividend = 425,000 and plough-back = 425,000	850,000
Inflation: say 3% x (8,500,000 – 1,800,000) (Note 2) Dividend on preference share capital	201,000
$7\frac{1}{2}\% \times 200,000$	15,000
Interest on loan stock:	
8 % x 600,000 48,000	
less tax @ 50% 24,000	24,000
Bank interest 9% x 1,000,000 90,000	
less tax @ 50% 45,000	45,000
Required profit after tax	1,135,000
Total capital employed (8,500,000 + 200,000 + 600,000 + 1,000,000)	10,300,000

: Overall rate of return required (after tax)

$$=\frac{1,135,000}{10,300,000} = 9\%$$
 per annum.

- Note 1: 10% has been assumed to be a reasonable earnings yield having regard to the industry and level of risk.
- Note 2: 3% per annum inflation has been assumed. It is necessary to maintain capital by providing an extra 3% on the equity capital. A real profit is made on the preference and loan capital; this is deducted from the requirement for inflation.
 - (b) The 9% rate of return may be regarded as a cut-off point for capital investment, i.e. investment is made only if the prospective return after tax (as given by the discounted cash flow yield) is at least 9% p.a.

This should be applied irrespective of the presumed source of finance, as all finance flows into a common pool from which all investments are made.

An alternative approach is to differentiate the 9% into a series of rates applicable to various categories of capital expenditure, e.g.

20% required on "risk projects"
9% required on "normal projects"
5% required on "no risk projects".

These categories require definition. Projects involving new revenue may be considered risk projects. "No risk projects" may be limited to cost-saving projects where the savings are definitely known from experience. All other projects might be counted as normal.

It is necessary also to check that the expected mix of projects will provide a weighted average return of at least 9% p.a., e.g.

Risk projects	- expected weigh	hting	20%	20% x	20%	=	4%
Normal	••		50%	9% x	30%		42/0
No risk		• •	30%	5% x	30%	=	12/0
			100%				10%

6. (a) (1) Research and development expenditure is capitalised only when it is substantial and when it is expected to result in benefits in future years. As such, it is like any other asset and should be included in the net capital invested. Each year a due proportion should be written off against the net profit.

Where R & D expenditure benefits more than one subsidiary company it should be apportioned according to presumed benefit.

- (2) Marketable securities may be omitted from the capital base, and income on these securities should correspondingly be omitted from net profit. The reason for this is that subsidiaries should be judged on the rates of their operating profits to operating assets. Marketable securities are not operating assets; they are held to improve the liquidity of the group as a whole.
- (3) If the capital investment is taken at current market values at the beginning of the year, both profit and capital will be in current terms, and no further correction need be made for changes in the general price level (excepting if there are very big changes during the year, both profits and capital may be adjusted by index systems into end-of-year rupees).
- (4) It is presumed that the debenture issue was a matter for the parent company, and that subsidiaries are not judged on their efficiency in capital gearing. In this case, subsidiaries are judged solely on the efficiency with which they use their total assets to generate profits i.e. on net profit before deducting debenture interest, on net capital employed (net of current liabilities only).
- (b) (1) In the long term, the most limited resource is capital. Therefore the most efficient management is the one that uses capital best to generate sales and profits.

(2) In selecting 12% as an annual average standard, the directors should have considered what return can be made in future on all capital investments, i.e. 12% is the cut-off point at which the total supply of capital meets the total demand within the firm.

The 12% may be an average of returns achieved in the past, and/or the figure that the different classes of capital have accepted. However the standard should not simply be based on past achievements, but represent what the directors think can be achieved in the future.

7. (a) Calculation of target profit (X)

Replacement of assets	Rs. 175,000	= 7000	
Less charged as depreciation	100 to 21982 12	4000	3000
Growth in new capital investme = 3% x 175,000 = 5250	nt l x 3000m s	idslieues Idslieues	
of which 70% to be financed from Dividend 15% x 80,000 (gross)	om profits		3675 12000
To fortness sets toomic wheather a		TE STE STATE	18675
Profit after tax Tax: 50% of (x + 4000) Less lump sum depreciation allo	nwance		$\frac{x}{2} - 2083$
$50\% \times 66\frac{2}{3}\% \times (7000 + 5)$	250)		2 2003
			X

Profit before tax

$$\therefore 18675 + \frac{x}{2} - 2083 = x$$

$$16592 = \frac{x}{2}$$

Target profit (x) = Rs. 33,184

(b) Total capital employed at replacement values at the commencement of the year — Rs. 275,000

$$\frac{33,184}{275,000} = 12\% \text{ p.a.}$$

- 8. The main ways of defining profit and capital employed in subsidiary companies are as follows:-
 - (i) Operating profit before tax Operating assets x 100

Operating profit means profit from normal operations and excludes any investment income, capital profits or losses, or exceptional or non-recurrent items such as an uninsured fire loss. Profit is taken before tax on the assumption that the management of the subsidiary have no control over the type of investment, i.e. they cannot reduce the tax payable by investing in assets carrying high tax allowances.

Assets should be taken at their current values.

(ii) Operating profit before tax Operating assets in use x 100

This limits the capital base to assets which are in productive use, i.e. it excludes assets under construction and assets out of action. This definition would be used where there are substantial assets not in use and it would be unfair to management to include them. As before, assets should be taken at their true current values.

(iii) Controllable profit Controllable assets x 100

Controllable profit is revenue minus controllable costs (i.e. excluding any apportionments of parent company costs). Controllable assets are assets which are actually under the control of each subsidiary company, e.g. excluding investments or surplus held for the liquidity of the group as a whole.

This definition would apply where there are appreciable costs or assets not under subsidiary control.

In all the above definitions, assets are taken without any deduction of current liabilities since the sources of finance are not so relevant as how the finance is used to generate profits.

		Company A	Company B
9.	(i) Purchase price of asset	Rs. 200,000	Rs. 550,000
	Index at date of acquisition Current replacement	40	100
	cost	200,000 x	$\frac{150}{40}$ 550,000 x $\frac{150}{100}$
		Rs. 750,000	= Rs. 825,000
	(ii) Age of asset in 1970 Accumulated depreciation to 1970, based on current replace-		20 years
	ment cost: 30	0 x 750,000	$\frac{20}{40}$ x 825,000
		= Rs. <u>562,500</u>	= Rs. 412,500

825,000

20,625

= Rs.

(iii) One year's depreciation, based on current replacement cost:
$$\frac{1}{40}$$
 x 750,000 $\frac{1}{40}$ x

N. B. The depreciation charged to Profit and Loss account should be based on historic cost only, i.e. Company A can charge only $\frac{200,000}{40}$ = Rs. 5,000 and the excess depreciation of Rs. 13,750 must be appropriated from profit.

= Rs. 18,750

Company B can charge
$$\frac{550,000}{40} = 13,750$$
 and appropriate Rs. 6875 (20,625 - 13,750).

In assessing capital employed, assets should be valued at their current values rather than at historic cost for the following reasons:—

- (i) historic cost is not relevant to comparisons of profit and capital employed; since profit is in current terms, capital employed should also be measured in current terms.
- (ii) if historic cost were used as a base, Company A would appear to be currently far more profitable than Company B. Suppose each company makes 10% p.a., i.e. A makes a net profit of Rs. 75,000 and B makes a net profit of Rs. 82,500. On the basis of historic cost (before depreciation) profitability would appear as follows:

Company
A B

$$\frac{75,000}{200,000} = 37\frac{1}{2}\%$$
 $\frac{82,500}{550,000} = 16\%$

This comparison is distorted by the out-of-date capital values.

- (iii) if the return on capital (measured in current terms) is inadequate, this indicates that the assets should be liquidated, e.g. Company A should make a net profit appropriate to an asset of Rs. 750,000 (less Rs. 562,500 depreciation) not to an asset of Rs. 200,000 (less Rs. 150,000 depreciation) since it can always sell the asset at its current value.
- (iv) Since return on capital employed is merely a statistical measure, there is no contravention of accepted accounting principles.

SECTION III

FINANCIAL EVALUATION

3.1 EVALUATION OF PROPOSALS

One of the services a management accountant provides is to evaluate proposals in the light of the financial objectives of the firm, and report in his advisory capacity to management.

To "evaluate" a proposal means to put a value on it. It is reduced, as far as possible, to the common denominator of money value. Any factors which cannot be quantified in money terms are merely listed and described. Similarly risk factors are listed and described. These non-quantifiable factors, sometimes (wrongly) called "intangibles", may have very real and tangible results. For instance, a proposal to give employees longer paid holidays may result in higher morale, and higher productivity.

Every proposal that may be expected to have significant financial or economic consequences should be financially evaluated. Proposals may be classified as follows:-

- (i) proposals for capital expenditure, e.g. an extension to the factory;
- (ii) proposals for current (revenue) expenditure, e.g. to allow longer credit to customers; to increase production on existing plant;
- (iii) proposals to allocate or deploy resources already purchased, e.g. use of machinery on the production of one product rather than another;
- (iv) proposals on prices and terms of sale of products;
- (v) proposals on acquisition of funds, e.g. whether to delay paying creditors, or obtain an overdraft, fund debt, etc.

The principles of evaluation apply equally to all classes of proposal.

"Proposals" includes not only projects, but also plans, such as the budget for the year, and policies. The management accountant does not himself challenge any project, plan or policy; he merely provides factual data on its financial consequences, and its impact on the financial objectives of the firm. Based on his analysis and evaluation, he should tender a conclusion on whether the proposal should be accepted, rejected, or perhaps modified. However the decision rests entirely with the manager responsible. The management accountant must bear in mind that there are other objectives than financial objectives, and other criteria than financial criteria.

3.2 DEFINITION OF PROPOSAL AND ALTERNATIVES:

For every proposal there is at least one alternative. The first rule of evaluation is that a proposal should be adopted only if it is better

than the best-looking alternative. Nothing can be evaluated except against an alternative.

If the proposal is, say, to expand manufacturing capacity, one alternative is not to expand. Other alternatives are to expand earlier or later than proposed, or more or less than proposed, or by different means.

The management accountant, in examining the proposal, will constantly be searching for alternatives that appear to be possible, and which may on evaluation prove better than the original proposal. Often he is told, "This must be done. There is no alternative", but close questioning reveals alternative ways of meeting the need which have not been thought of by those responsible for the proposal. Line managers may put up a proposal and an alternative which proves that the proposal is best; the management accountant nevertheless looks for better alternatives.

The first step is to define the proposal. Who is going to do what, using what resources, where and when? What benefits are expected, to whom, where and when? If the proposal is large or complex, and has not been properly co-ordinated, the management accountant may find himself in the position of co-ordinator, making sure that every person concerned is providing forecasts, assessments, etc. on the same assumptions, and to a time-table that will enable decisions to be made or approvals to be obtained within the required time.

Similarly, feasible alternatives are suggested, worked out in consultation with those concerned, and defined in the same specific terms, in preparation for the next step.

3.3 INCREMENTAL CASH FLOWS

From a financial point of view, a proposal (project) is completely described by its cash receipts, cash payments, their timing, and the risks attaching to them, since all quantifiable costs are cash costs and all quantifiable benefits are ultimately received in cash.

The timing of cash receipts and payments is important since cash cannot be re-invested until it is received. A project that shows quick returns is preferred to one that shows the same returns later on because the returns in the first project can be re-invested and earn higher profits for the firm. With an average rate of profit of, say, 10% p.a. this can put a project in an entirely new light.

It may be asked why we do not take profits (revenue less costs) rather than receipts and payments. When stock is sold to an account customer, we have revenue and profit, even though the cash is not received till later. The answer is that, though conventionally we take profit in the accounts at the point of sale, until the debt is paid we are paying interest on the cash spent on acquiring or producing that stock. Only when cash is received do we know the true profit, and only when cash is received can it be re-invested elsewhere.

The next step, therefore, is to obtain forecasts on the basis of which we can define the cash flows (receipts and payments each year).

If we are evaluating a proposal against an alternative, we need not concern ourselves with cash flows which will be the same in both cases, since these cannot affect the comparison. If, for instance, we are evaluating a plant expansion against not expanding, we would need estimates of:

- (i) capital costs of expansion (by year of payment if spread over more than a year), and any scrap value;
- (ii) costs (by year of payment) over and above the existing level e.g. additional variable costs such as materials, labour, power, sales commission etc. and any additional fixed costs, e.g. increase in rent, but no additional share of costs that will not be increased, e.g. Head Office administration:
- (iii) revenue (by year of actual receipt) over and above the existing level.
- (iv) tax consequences of the above.

If we are evaluating a cost-saving project, the savings count as receipts and should exceed the total payments for the project to be worthwhile.

Accountants often provide costs and unit costs which include a share of fixed and indirect (or overhead) costs. The management accountant should look for costs that will actually increase as a result of the proposal, and ignore allocations and apportionments of costs that will not increase (but see 3.5 below on opportunity costs). It is sometimes said that it is only fair or equitable for a project to bear its share of pre-existing overheads. This may be true but the management accountant is not concerned with fairness or equity: his job is to say what difference the proposal will make to the total profit, and for this purpose he measures differential effects only.

Example: The ABC Company Ltd. is considering expanding its production of wood furniture from 15,000 tables a year to 20,000 tables a year. The cost accountant reports that the present cost of a table is Rs. 47 made up as follows:

Timber Glue, wood dye, & varnish Direct labour	• •	.:		30 1 4
Poisson Cont				25
Prime Cost		* *		35
Production overhead (all fixed)			7	
Administration			3	
Selling & distribution	4.		2	12
			-	
Total Cost				Rs. 47

The price of timber is expected to rise 10%. Also production overhead will increase by Rs. 10,000/year due to extra staff necessary on the increased production. Selling price is fixed at Rs. 50.

It is suggested that the profit from the extra 5,000 tables will be Rs. 12,500 as follows:

Timber			40.	33
Glue, wood dye & varnish	1			1
Direct labour			• •	4
				38
Production & other overhead	eads			
$(15,000 \times 12) + 10,000$				9.50
20,000				
New total cost		• • •		47.50
Net profit		• •	• •	2.50
Selling price			• (•)	50.00
				/
$5,000 \times 2/50 = \text{Rs. } 12,50$	00			

On an incremental approach, the extra profit in fact is Rs. 50,000 as follows:

Incremental revenue 5000 x Rs.	50		250,000
Less incremental costs – Variable costs 5000 x Rs. 38 Production overhead		 190,000 10,000	200,000
			Rs. 50,000

Ordinary accrual accounting also includes depreciation as a cost. The management accountant ignores this as it is not a cash payment, but merely a book entry. (He has already counted in capital expenditure; to bring in depreciation would be to count it twice).

Working capital is another item which appears on the financial accountant's Balance Sheet, but is automatically included in the evaluation by forecasting payments and receipts as they will in fact occur. Working capital is stocks, debtors, etc. (in excess of creditors) and may be expected to increase if plant is expanded. From a cash point of view, working capital is the cash spent on materials, labour etc. which goes into stock, then into debtors, and is recovered only later in its original cash form. On a schedule of cash flows, this will be seen as cash payments occurring before receipts start coming in. At the end of the life of the plant, it will be seen as cash payments stopping (end of production) but cash receipts going on until all stocks and debtors are realised.

Since we are evaluating the project in total, and not any particular year of operation, we need to estimate the incremental cash flows over its whole life. This is sometimes difficult for a project (or policy) that

is expected to have consequences going ahead for more than 5 years or so, as the time-horizon of forecasting does not always reach so far. However this is not so serious, as distant cash flows are much less significant in the evaluation than cash flows in the near future. It is more important (i) to get the best possible estimate of the period affected by the proposal, e.g. in the case of a capital project, the expected working life of the asset, with reasonable allowance for obsolescence, etc. and (ii) to estimate the cash flows as well as possible right up to the end of this period, even though the later years may be merely a conjectural projection from earlier years. Sales managers, engineers, etc. are sometimes reluctant to provide estimates going far ahead, but it is logically impossible to evaluate a project without bringing into account all its significant consequences. Forecasting difficulties are a fact of life; to ignore distant returns on the grounds of possible inaccuracy, is to estimate those returns at nil, which is usually less accurate than figures based on an intelligent guess. (It may be mentioned here that methods of evaluation which ignore project life, such as rate of return on capital, and payback, add methodological errors to errors in the forecast data, and should not be used except as a preliminary screen, to distinguish extremely good proposals from extremely bad ones).

An evaluation is really the evaluation of a decision between two alternatives. We come to a fork, from which lead two or more definable paths or courses of action. Each course of action will have certain financial consequences (cash flows). By measuring and comparing alternatives according to the financial objective or criterion, we can choose the right fork (decide). If there are more than two courses of action, they are evaluated one pair at a time, e.g. (i) should we get a new lorry to replace an existing one? This is evaluated by comparing the cash flows from a new lorry with the cash flows to be expected from continuing with the existing lorry. The difference between these two sets of cash flows is the incremental cash flows from the new lorry, which tell us whether it is better to have a new lorry. Then (ii) if we get a new lorry should we hire it, or purchase it outright? Again each alternative sets up a stream of cash flows and the difference between the two streams shows which one is to be preferred. Similarly, (iii) should we replace it now, or in a year's time? etc.

3.4 IRRELEVANCE OF PAST EXPENDITURE AND BOOK VALUES

Nothing that happens before we come to the point of decision can affect the decision, since we decide solely on the future consequences. This may sound surprising. Surely we judge and decide in the light of past experience? It would be more accurate to say that we decide (or ought to decide) purely on *future* expectations, and it is these expectations which are influenced by past experience. Our past experience does not directly determine our decisions, but indirectly by improving our assessment (forecast) of what will happen if we choose this or that future course.

This has important practical implications. Many a firm has refused to sell stock below cost in a falling market and has thereby made a bigger loss because its decision was based on the past (what did it cost?) rather than on future alternatives. Similarly, a firm which has spent a lot of money on research for a new product, faced with a decision whether to go ahead and manufacture and market the product, should ignore the research costs (which are past or "sunk costs") and evaluate the decision on its future cash flows alone. (The future cash flows may of course be better as a result of the research). The research costs are no doubt attributable to the project as a whole, but the decision is not concerned with the project as a whole, but with what remains to be spent and received after the decision.

Example. – An engineer invented and developed a new kind of pneumatic valve at a cost of Rs. 8000. The estimated manufacturing cost was Rs. 15, and selling price Rs. 20. However, the potential sales volume of 1000 appeared to him insufficient to recover his development costs, so he scrapped the project.

On an incremental approach he would have reasoned that future incremental revenue would be Rs. 20,000 and future incremental costs Rs. 15,000. Therefore by going ahead he would have made Rs. 5,000 and reduced his overall loss from Rs. 8,000 to Rs. 3,000.

Another common mistake of the same kind is to bring into the evaluation of a new asset the written down value (cost not yet charged to profit and loss account) of assets that would be scrapped if the proposal is accepted. In the event of scrapping, the balance of cost of these assets has of course to be written off, but this is a book loss which will in any case be incurred. How assets are charged to Profit and Loss account does not make a cent difference to the wealth of the firm or to book profits in the long run (tax consequences apart). An asset should be purchased if its extra revenue or cost savings justify it, irrespective of the cost of the existing asset, or how recently it was purchased, or how much of its cost remains on the books.

Example: – The production manager of a small jobbing engineering works was considering replacing a lathe with a new multi-function model that would cost Rs. 10,000 but would enable the works to take on a wider variety of work, and schedule jobs more efficiently. Extra revenue, net of costs, and cost savings attributable to the replacement were estimated at Rs. 5,000 a year for 3 years. However, the existing machine was not replaced because it was only two years old and stood in the books at Rs. 6,000 (Rs. 10,000 cost less Rs. 4,000 depreciation). There was no market for the older model, so the Rs. 6000 would have been a complete write-off. The Directors called this "unacceptable".

On an incremental approach, the machine would have been replaced as follows:

Initial outlay 10% interest in 1st year

Rs. 10,000 1,000

	Rs.
	11,000
Less net revenue and cost savings	5,000
Eess net revenue una coot ou ang	
	6,000
10% interest in 2nd year	600
10,75 Microsoft 11 212 5 212	
	6,600
Less net revenue and cost savings	5,000
	to the state of
Treat the state of	1,600
10% interest in 3rd year	160
70	
	1,760
Less net revenue and cost savings	5,000
Extra value created by new machine	3,240
	*

The same result could be obtained on accrual accounting:

The same result co	uld be	obtain	ied on accrual accoun	nting:				
REPLACEM	1ENT		NO REPLACEMENT					
Year 1 Net revenue, say extra net revenue		7000 5000	Net revenue, sa Depreciation	y 7000 2000				
		12000						
Less loss on old machine depreciation on	6000							
new machine interest cost	3333 1000	10,333						
Net effect on Profit and Loss account		1667 1	profit	5000 profit				
Year 2 Net revenue	-	12,000	Net revenue	7000				
Less depreciation interest	3333 600		Depreciation	2000				
		8,067	profit	5000 profit				
X 2 3 1		12 000						
Year 3 Net revenue Less depreciation	3334	12,000	Net revenue	7000				
interest	160		Depreciation	2000				
toutest the same who	10 5 t	8,506	profit	5000 profit				
Total of 3 years		18,240	profit	15,000 profit				
Difference			Rs. 3,240	ni Amelai " Ai				

The management accountant should also beware of the budget. Perfectly sound projects, schemes, etc. may be proposed in the course of the year which are not within the budget. Each proposal should be evaluated on its merits (cash flows), irrespective of the budget. Secondly, if the alternative against which a proposal is being assessed is *not* to adopt the proposal, the budget should not be taken as the basis for the latter unless it is in fact an up-to-date and realistic assessment of what will happen if the proposal is not accepted.

The investigation of alternative sets of cash flows is the heart of financial evaluation, and the management accountant should pursue this search until he is satisfied that all main avenues have been explored, and he has a feeling for the relative degrees of risk. On the other hand, he should not hold up his report for the sake of greater accuracy or detail than is strictly required for the decision. He sometimes has to balance the cost of further research against the cost of a late decision.

Any differences between alternatives that he cannot express in cash terms (non-quantifiables), and opinions, subjective assessments etc., he will merely note and report.

3.5 OPPORTUNITY COSTS

If a project is going to use assets, personnel, or facilities that the firm already has, usually there is no question of incremental payments.

This is merely a deployment of existing resources, not the purchase of additional resources, so the cash flows for the project will not include any payments directly for the use of such resources. This includes use of labour which is already on the payroll, use of plant, machinery, furniture and fittings, motor vehicles, computer or other assets, owned or hired by the firm, and use of accommodation (office space, stores space, etc.) which is already owned or rented.

However, use on the proposed project may prevent use for some other purpose either immediately or in the future, and so lose revenue or add to costs. For instance, if machinery is being used 80% of its time in producing product X and it is proposed to use 50% of its time on product Y, product X will be restricted to the remaining 50%. Therefore, as a consequence of adopting the proposal we will lose the profit on the reduced production of X. Also, if there was any possibility of expanding production of X above 80% machine utilisation, that opportunity is also lost. The "opportunity cost" of Y includes the lost profit on X, i.e. the sales revenue foregone, minus the costs saved (usually only variable costs) on reduced production of X.

Opportunity costs, therefore, are cash costs *indirectly* caused by a proposal, and should be entered in the appropriate years, in the same way as cash payments directly caused by a proposal.

It is not always easy to assess opportunity costs. Suppose a proposal to enlarge a stores includes the use of accommodation already rented, but not used to capacity. The opportunity cost of this space is at present

nil (since it has no other use), but it may be that later on we may be needing additional office space. Then we will either have to go out and rent more space (cash flow) or accept some degree of overcrowding (reduced morale of staff, perhaps leading to reduced efficiency and loss of profit = cash flow).

Note that if the proposal is adopted, the cost accountant will charge to the enlarged stores a higher proportion of the present rent, security, lighting and other space costs, but this allocation of costs is not the same as the consequential opportunity costs, and the management accountant should wherever possible delete allocations of existing costs, and substitute the cash costs of reasonably foreseeable lost opportunities. If no alternative uses exist or are expected, spare capacity is free to the proposal.

If, on the other hand, a proposal will cause the rent (or any other cost) to be increased, the whole of the increase is a cash flow against the proposal, even though this may be more than the cost accountant's allocation. The rule is always to identify incremental cash flows arising from the decision, both directly and indirectly.

3.6 COST OF CAPITAL

Where cash is paid out and will not be recovered in receipts for a long time (say for a year or more), interest on the money laid out is an opportunity cost, since it would otherwise be invested elsewhere in the business and earn additional profit. This profit is lost if the proposal is accepted, and should therefore be included in the schedule as a cash payment.

It might be objected that cash is not always re-invested, but this would imply an increasing cash balance as sales proceeds were received. Usually a firm does not allow a large cash balance to remain unremunerative for long since this would not be employing shareholders' funds to the best advantage. It can normally be assumed that as cash is received so it is re-invested in production or purchase of stocks and other assets, except for a "buffer" balance in hand which absorbs fluctuations in the rates of inflow and outflow.

If is difficult though, to *identify* the investments and profit which will be lost by reason of a proposed project. All one can usually say is that the business consists of a pool of projects, making a certain average rate of profit. If this is, say, 10% p.a. then Rs. 100 spent on the proposal will be losing Rs. 10 p.a. elsewhere in the pool. Therefore, the opportunity cost of capital is taken as the average return on all capital to be expected in the future (often taken as the average return made in the past for convenience).

This average return is the "cost of capital" not only as an opportunity cost, but also in terms of the interest and dividends that will be paid out to the various sources of capital. If debenture holders are paid 8% p.a. this is the cost of debenture capital (ignoring tax); if ordinary shareholders are paid a dividend which, as a percentage of nominal

share capital plus reserves, averages 13% p.a., then this is the cost of equity capital. The overall cost of capital is a weighted average of these, e.g.

$$13\%$$
 on (say) Rs. 200,000 equity (incl. reserves) = Rs. 26,000
 $+8\%$ on (say) Rs. 300,000 debentures = Rs. 24,000
 $=10\%$ on Rs. 500,000 total capital = Rs. 50,000

Suppose a project is to be paid for by raising an overdraft, should we then charge the project the rate payable on the overdraft (which is normally a cheaper source of finance than long term capital)? No, because the opportunity cost of capital is still the 10% p.a. lost. Also, since the ability of the firm to raise overdrafts (and other forms of debt) is limited, the cheap finance has been lost by some other project. The project is merely the occasion for raising an overdraft; there is no reason to give it the advantage of a low cost of capital in comparison with other equally eligible projects.

3.7 OPPORTUNITY REVENUES

These are cash receipts indirectly caused by the proposal, and must also be brought into the schedule of cash flows. An example would be a proposal to sell a product complementary to an existing product; this would indirectly improve the sales of the existing product, causing additional revenue, less additional variable costs.

3.8 DISCOUNTED CASH FLOW

"Discounted cash flow" (D.C.F.) is a general term for all methods of financial evaluation (especially of capital projects) which take into account all quantifiable factors, including the *timing* of consequential cash flows. As explained in section 3.3, earlier cash receipts are worth more than later cash receipts because they can be reinvested to make additional profit.

There are three main methods of applying D.C.F.:

- terminal value method
- present value or net present value method
- yield or internal rate of return method.

3.9 TERMINAL VALUE METHOD

The terminal value method simply adds all the incremental cash flows attributable to a proposal, counting receipts as plus, and payments (including interest on capital) as minus. The result is called the *terminal value*, and represents the extra wealth of the firm from the project at the end of its life. If this is *positive* then, subject to risk and other non-quantifiables, we *accept* the proposal. If the terminal value is negative, the proposal is rejected.

Example: A simple example will show the mechanics of calculation. It is proposed to mechanise a manual invoicing system. The equipment will cost Rs. 18,000 and is eligible for a $66\frac{2}{3}\%$ tax allowance (lump sum depreciation). It is expected that it will save two clerks, who get on average Rs. 300 per month, including allowances. The equipment is expected to last 5 years. Power and maintenance will be Rs. 200 per year. Cost of capital is 10% p.a. after tax. Rate of tax is 50%, and is payable one year in arrears of profits.

Cash flows are set out as follows:

		Now	End of year 1	End of year 2	End of year 3	End of year 4	End of year 5	End of year 6	Check Column
1.	Clerical savings 2 x Rs. 3600/year		+7200	+7200	+7200	+7200	+7200		+ 36,000
2.	Power & main- tance		-200	-200	-200	-200	-200		-1,000
3.	Effect on profit before depreciation		+7000	+7000	+7000	+ 7000	+7000		+35,000
4.	Additional Tax (50%)			-3500	-3500	-3500	-3500	-3500	-17,500
5.	Equipment cost	-18, 0 00							-18,000
6.	Tax allowance (66% % x 50%)		+6000						+6,000
7.	Net cash flows before interest	-18,000	+ 13000	+3500	+3500	+3500	+ 3500	-3500	+5,500
8.	Interest @ 10%		-1800	-680	-398	-88	+253	∔629	-2,084
	Cumulative cash flow	-18,000	-6800	-3980	-878	+2534	+6287	+3416	+3,416

- Note: (1) All consequential cash flows are brought into the calculation of the terminal value, which is plus Rs. 3,416. This happens to be at the end of year 6 since this is the last year affected by the decision we are evaluating; the period covered is usually a year or so longer than the life of the equipment, since we still have to pay tax on our additional profit in the last year of operation.
- (2) Tax consequences are split between the tax credit we get on the purchase of capital equipment (assumed one year in arrears), and the additional tax payable on all items that affect taxable profit (before depreciation) each year.
- (3) The total interest on capital Rs. 2,084 (profits lost elsewhere), is calculated by taking 10% on each year's cumulative cash flow, as reduced by earlier inflows. If we lay out Rs. 18,000 now, we will lose Rs. 1,800 elsewhere in year 1. However, by the end of year 1, we have saved salaries, etc. (offset by higher power and maintenance payments) of Rs. 7,000 and reduced our tax by Rs. 6,000. This is equivalent to

a receipt of Rs. 13,000, against the original outlay of Rs. 18,000 and interest of Rs. 1,800. Therefore the project has only Rs. 6,800 unrecovered at the end of year 1, and interest in year 2 is therefore Rs. 680.

By the end of year 4, all costs have been recovered. From year 5 therefore, we add 10% of the cumulative cash flow. This represents additional profit the firm can make by reinvestment elsewhere, and is properly attributed to this proposal which enables it to arise. It is an opportunity revenue just as earlier interest was an opportunity cost.

Total interest on capital cannot be calculated except from year to year since it depends on the pattern of net cash flows. Note also that the accounting distinction between capital and current expenditure is not relevant here; all cash paid out loses income elsewhere.

(4) Grouping cash flows by year, and treating cash flows during a year (e.g. salaries saved) as though received and paid at the end of the year are conventions of D.C.F. which simplify the arithmetic. Obviously it would be more accurate to show the salaries saved month by month, and to put tax effects into the actual months of payment and credit against payment, etc. but this would require over 60 columns with interest calculations from month to month, and the additional accuracy is not usually worth the extra work.

3.10 THE PRESENT VALUE OR NET PRESENT VALUE METHOD:

This is the classic D.C.F. method, used by economists since the 19th century.

Instead of compounding cash flows forward to a terminal value, they are discounted back to the present value. This is usually done by taking each year's net cash flow, discounting it to its present value equivalent, and summing the present values. This gives the total present value (PV) of the project, and if this exceeds the original capital outlay, the project is accepted. The excess of PV over capital cost is the net present value (NPV).

If terminal value (TV) is positive, so is NPV. If TV is negative, so is NPV. The same rule applies to NPV as applied before to TV; if it is positive the project is accepted; if it is negative the project is rejected.

The present value of any future sum of money is the sum which, invested now at a certain rate of interest with interest re-invested each year, would amount to that future sum at that future date.

Rs. 100 invested now at 10% compound interest would amount to Rs. 110 (100 x 1.10) after 1 year, Rs. 121 (100 x 1.10 x 1.10) after 2 years, Rs. 133/10 (100 x 1.10 x 1.10 x 1.10) after 3 years, and so on. The compounding formula is therefore to multiply by $(1+r)^n$ where r represents the rate of interest, and n the number of years. Conversely, Rs. 133/10 after 3 years has a present value of Rs. 100. The discounting formula is therefore to divide by $(1+r)^n$,

(Discounting tables give the value of $\frac{1}{(1+r)^n}$ for different rates of interest and periods of years, so these are used as multiplying factors. See Table A at the back of this book).

Applying this to the net cash flow in the previous example:

Net cash flows Divide by	Now -18,000	Year 1 +13,000 1.10	Year 2 +3500 1.102	Year 3 + 3500 1.103	Year 4 +3500 1.10*	Year 5 + 3500 1.105	-3500
or multiply by factors per table Present value	-18,000	.909	.826 +2891	.751 +2629	.683 +2391	.621 +2174	.564
Total present value				+19,928			
Net present value				+1,928	(19,928	- 18,000)

Just as the TV represents the additional wealth that will arise from a decision, so NPV represents the present value of that additional wealth and may be proved by discounting TV back over the period:

$$3416 \div 1.10^6 = 1928$$

3.11 THE YIELD OR INTERNAL RATE OF RETURN METHOD

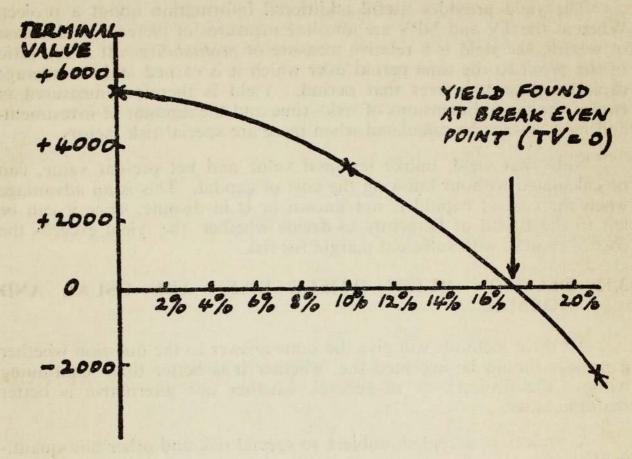
It should be apparent from the schedule of cash flows in 3.9 above that if the interest cost of capital were higher, the terminal value would be reduced. The interest rate that would reduce the terminal value to nil is described as the yield, or internal rate of return, or (by Keynes) the marginal efficiency of capital.

If the yield from a proposal is higher than the firm's cost of capital the proposal is accepted (subject to considerations of risk and other non-quantifiables). The yield is found by selecting a rate of interest which will probably make the TV negative, and then interpolating. In this case, we will try 20%:

$$\therefore$$
 yield = 10% + $\left\{\frac{3416}{5770}\right\}$ = 16%

Instead of interpolating, the yield may be found by plotting on a graph the terminal value at three widely spread rates of interest. Three points are the minimum to draw a curve, but this does not require any further calculation, since we know the terminal value at *nil* interest: it is simply the total of all net cash flows. Thus we have:

At
$$0\%$$
 TV = $+5500$
 10% $+3416$
 20% -2354



This more accurate method shows that the yield is nearer 17% than 16%.

The yield is the rate of interest which reduces the terminal value to nil, or which reduces the net present value to nil. The same method applies: the net present value is found at 10% and 20% (or any range which is likely to include the final yield) and the yield is found by interpolation, or by plotting the points on a graph. (The net present value at 0% is the total of the net cash flows, as with the terminal value). This trial and error approach cannot be avoided except in the rare case when cash flows are the same each year; this special case can be solved by formula or by annuity tables (see Table B at the back of the book).

The yield may be proved by entering it as the interest cost of capital:

*This is close enough to nil; it is not necessary to take decimal points of a percent.

This shows that the yield is the highest rate of interest that could be paid on the capital outstanding and yet have the project break even; therefore it is the return on capital employed in the project. (If all projects

that comprise a business were making a yield of, say 10% p.a. after tax, this would be the rate of growth of the firm as a whole, as measured in section 2.5 (v).

The yield provides useful additional information about a project. Whereas the TV and NPV are absolute measures of increase or decrease of wealth, the yield is a relative measure of profitability. It is the ratio of the profit to the time period over which it is earned and the average capital outstanding over that period. Yield is therefore measured in two of the main dimensions of risk—time and the amount of investmentand must always be calculated when there are special risk factors.

Note that yield, unlike terminal value and net present value, can be calculated without knowing the cost of capital. This is an advantage when the cost of capital is not known or is in dispute, since it can be left to the Board of Directors to decide whether the yield exceeds the cost of capital, with sufficient margin for risk.

3.12 DECISION RULES WHERE RISKS ARE USUAL AND NORMAL

All three methods will give the same answer to the question whether a project should be accepted (i.e. whether it is better than continuing without the project), or in general, whether one alternative is better than the other.

A project is accepted, subject to special risk and other non-quantifiables:

- (i) if its terminal value is plus
- or (ii) if its net present value is plus
- or (iii) if its yield exceeds the cost of capital.

Similarly alternative X is preferred to alternative Y, subject to special risk and other non-quantifiables:

- (i) if the terminal value of X is more than the terminal value of Y (which implies that the terminal value of the increment or difference of X over Y is plus)
- or (ii) if the net present value of X is more than the net present value of Y (which implies that the net present value of the increment or difference of X over Y is plus)
- or (iii) if the yield from the incremental investment in X over Y is more than the cost of capital

The last rule (iii) carefully avoids one of the big traps in investment appraisal. If alternative X promises a bigger yield than alternative Y, it might be thought that X should be preferred. This is not necessarily so as the project with the smaller yield may yet show the larger absolute profit.

Example: An oil company has a choice between installing a 5" pipe-line or a 7" pipe-line. The cost of capital is 10% per annum. Having proved by DCF that either a 5" pipe-line or a 7" pipe-line is better than no pipe-line, the problem is now which pipeline would be more profitable?

The figures are as follows:

5" pipe-line (against no p Net cash flows Interest @ 10% Cumulative cash flows	oipe-line 	-1000 -1000	+475 -100 -625	+475 -62 -212	$\begin{array}{c} +475 \\ -21 \\ +242 \end{array}$ TV is $+242$
Interest @ 20% Cumulative cash flows		-1000	-200 -725	-145 -395	-79 \ Yield +1 \ is 20 %
7" pipe-line (against no pi Net cash flows Interest @ 10% Cumulative cash flows	ipe-line) 	-1300 -1300	+600 -130 -830	+600 -83 -313	+600 -31 +256 TV is +256
Interest @ 18% Cumulative cash flows		-1300	-234 -934	-168 -502	-90) Yield +8) is 18%

At first sight this appears paradoxical. The 7" pipe has the higher terminal value, but the 5" pipe has the higher yield. Which is better? The answer is that the 7" pipe with the higher terminal value will add more absolute profit, but this really comprises two separate projects (i) the 5" pipe and (ii) the incremental investment in the 7" pipe. Let us examine the incremental investment:

7" pipe-line against 5" pip Net cash flows Interest @ 10% Cumulative cash flows	e-line	-300 -300	+125 -30 -205	+125 -21 -101	+125) -10 TV is +14 +14
Interest at 12% Cumulative cash flows		-300	-36 -211	-25 -111	-13 Yield +1 is 12%

Notice (i) that the terminal value of 14 is the difference between the separate terminal values of 242 and 256. This is bound to be so as the same rate of interest has been taken in each case, and (ii) that the incremental yield must exceed the cost of capital (12% > 10%) as the terminal value is plus.

The 7" pipe-line consists of a yield of 20% on the basic investment plus 12% on the incremental investment; 18% is a weighted average of the two investments.

12% is still above the 10% cost of capital. Therefore, subject to special risk attaching to the larger project we prefer the 7" pipe-line. In effect it offers everything the 5" pipe offers, plus the chance of making 12% on the extra outlay.

If there is no special risk attaching to two alternatives, i.e. no significant risk difference between them, it is not necessary to compute the incremental terminal value or yield. As we have seen, the incremental yield of X minus Y is positive if the terminal value of X exceeds the terminal value of Y.

The decision rule for alternatives can now be simply stated:

If there is no significant risk difference, choose the alternative with the higher terminal value or net present value.

If this rule is consistently followed, and if forecasts prove correct, the firm will maximise its long run absolute profit, since resources would only be purchased or re-deployed where this is expected to increase the firm's wealth.

3.13 DECISION RULES WHERE THERE IS SPECIAL RISK

If we are evaluating a project against "no project" or in general, one alternative against another, risk means the possibility of coming to the wrong conclusion because of errors in the *forecasts*, or errors in the *evaluation*, and so losing the difference between the wealth created (or lost) by our actual decision and the wealth that would have been created by deciding in favour of the alternative.

Evaluation errors comprise errors of method, errors of logic and errors of arithmetic. These are within the control of the analyst. Errors in forecast data may be reduced by care and research, but are never entirely eliminated.

There are two ways of treating forecast errors:

(i) get "best estimates" for each revenue and cost figure and assess risk globally at the end. This is then compared with the yield. If the yield is very high, actual revenue may be lower or costs higher without disturbing our decision. If the yield is about equal to the cost of the capital, we should accept the project only if it is no more risky than the average project. If the yield is low, it should be accepted only if the risk is correspondingly low. Some firms break up their cost of capital into different categories of investment according to presumed risk, e.g.

				Proportion of Total Investment
Minimu	m yield	on new products	20%	10%
,,	,,	on expansion of existing products on cost-saving investments-	15%	20%
,,	,,	high risk	10%	30%
,,	,,	on cost-saving investments- low or nil risk	5%	40%
Average	yield (weighted)	10%	100%

(ii) get three estimates for each doubtful figure representing the worst, most likely, and best expected, and make three calculations to show the range expected. If a project meets the cost of capital even after all the "worst" revenue and "worst" cost figures, evidently it should be accepted. If the worst is below the cost of capital, but "most likely" and "best" are above, this may also be accepted, but it will depend on how bad the "worst" case is.

For any major factor which is either/or (e.g. either we get an important government concession or we don't), make two calculations to show the profitability in each case.

If there is just one very uncertain variable factor on which the whole project depends, e.g. sales volume (all costs being fairly definite), the analyst should work out what minimum sales would have to be achieved for the project to break even after allowing for the cost of capital. This focusses attention on the critical factor. If there are a number of uncertain factors the analyst should calculate the impact on profitability of variations in each factor in turn. This analysis reveals how sensitive the decision is to each separate factor. As a rule of thumb, if a 10% error in any of the following factors would alter the decision, it is worth spending more time and money on a better forecast:

Sales volume

Selling price

Economic life

Unit cost of production or purchase

Gestation period (from start of expenditure to full production)

Capital investment.

The decision rule may now be re-stated:

A project is accepted if the yield covers the cost of capital with due allowance for risk and other non-quantifiables.

Similarly, alternative X is preferred to alternative Y if the yield from the incremental investment in X over Y covers the cost of capital with due allowance for any extra risk in X compared with Y.

What is "due allowance" for risk? If we knew that 1 project would be a total failure for every 10 successes, we would require an extra 10% yield as a risk premium. However, most business risks are uncertainties of the kind that cannot be quantified. In the final analysis, investment appraisal is based on good judgement of risk.

Example: The directors of an oil refinery are considering erecting plant to use by-product streams from its main crackers in the production of ethylene, for which there are a number of potential industrial uses. Preliminary enquiries indicate a probable capital cost of Rs. 800,000, and fixed costs of Rs. 100,000 a year. Revenue is forecast as follows:

100,000 Rs. Year 1 600,000 Rs. Year 2 Rs. 1,000,000 Thereafter

However, the sales volume may be up to 20% lower (at the same price). The variable costs are half the revenue. The life of the plant is also uncertain, and might be 5 years or 7 years. It would have no scrap value. The cost of capital is 10% p.a.

Evaluate the project, ignoring working capital and tax.

(i) Full revenue, 5 year life (Rs. 000)

	Now	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Total
Capital Revenue Variable costs Fixed costs	-800	+100 -50 -100	300	+1000 -500 -100	-500	+1000 -500 -100	-800 +3700 -1850 -500
Net cash flows Interest @ 15%	-800	-50 -120	777	+400 -137	+400 -98	+400 -52	+550 -552
Cumulative	-800	-970	-915	-652	-350	-2	-2

(ii) 80% revenue, 5 year life (Rs. 000)

Capital Revenue Variable costs Fixed costs	-800	+80 -40 -100	+480 -240 -100	+800 -400 -100	+800 -400 -100	+800 -400 -100	-800 +2960 -1480 -500
Net cash flows Interest @ 5%	-800	-60 -40	+140 -45	+300 -40	+ 300 -27	+300 -14	+180
Cumulative	-800	-900	-805	-545	-272	+14	+14

(iii) Full revenue, 7 year life (Rs. 000)

	Now	1	2	3	4	5	6	7	Total
Net cash flows per above Interest @ 24%	-800								+1350 -1332
Cumulative	-800	-1042	-1092	-954	-783	-571	-308	+18	+18

(iv) 80% revenue, 7 year life (Rs. 000)

Net cash flows per above Interest @ 15%	-800				+300 -125			+300 -34	+780 -742
Cumulative	-800	-980	-987	-835	-660	-459	-228	+38	+ 38

The five-year project yields 15% on capital employed against a 10% cost of capital. This may drop to 5% if the projected sales volume is only 80% realised. On the other hand, it could climb to 24% if the life of the plant is extended to 7 years. The project is recommended unless it is thought that both a shortfall of revenue and a 5 year life are probable.

Note: The yield percentages are found by trial and error. The amount of arithmetic is quite high when the yield is tested by this kind of sensitivity analysis, but is well worthwhile in terms of the extra information provided.

3.14 TREATMENT OF INFLATION

Inflation is the risk that future money is worth less than present money, even after allowing for the interest difference. Suppose that capital costs 10% p.a. but that inflation is expected to average 3% p.a. in the future. A project to spend Rs. 100 and get Rs. 113 after 1 year shows a 13% yield in money terms, but only 10% in real terms, since the Rs. 113 will buy only Rs. 110 of present goods.

(Strictly, Rs. 113 next year will buy only $\frac{113}{103} = 1.097$ times this

year's goods, so the true yield is 9.7%, but for small percentages it is a good approximation to subtract).

The simplest way of treating inflation is to enter the expected cash flows in money terms (i.e. increasing cash costs where these are expected to increase, and increasing revenue for any expected price increases), calculate yield in the normal way (this is the yield in money terms), and then deduct the percentage rate of inflation to get the yield in real terms.

Often reported yields are money yields, it being understood that this covers the risk of inflation as well as other risks.

3.15 PAYBACK (OR PAYOUT) METHOD

The payback method measures the period taken to repay the initial outlay. It is based on the actual pattern of returns. For instance, a project to spend 100 and get 40, 50 and 60 in successive years would have a payback period of $2\frac{1}{6}$ years since this is the point at which the 100 would be entirely recovered.

It does not take into consideration interest on capital, and usually ignores tax also. In the example in 3.9, Rs. 18,000 is repaid at Rs. 7,000 year, therefore the payback period is 2\frac{4}{7} years. This is compared against some arbitrary standard. Different standards may apply for different types of project, e.g. management may refuse to accept a high-risk project unless it promises to return the capital within 2 years; for a low-risk project the limit may be 4 years.

It is like D.C.F. in that it is based on cash flows, not profits. As a general rule cash flow is equal to profit plus depreciation added back minus working capital increases (which is the same as cash revenue minus cash costs). It has the same advantage as the TV method in that it shows clearly the *pattern* of returns; management can see how much capital is unrecovered at the end of each year, the effect of the gestation period, and the year in which the project "breaks even" (subject to the

omission of tax and interest on capital). This is especially advantageous where the risk of not getting the expected returns increases rapidly year by year, e.g. in an industry with rapid technological changes.

However it is only partially a measure of profitability, since it ignores all returns after the payback period. A Rs. 1000 project which promises to return Rs. 500 a year for 2 years only would be preferred to a project, also for Rs. 1000, returning Rs. 400 a year for 3 years, (which is more profitable). This is sometimes allowed for in evaluation by reporting both payback period and the life of the project, but this is unsatisfactory, since the relative weight to be given to each factor is not clear. Also it ignores the timing of returns within the payback period. (-1200 + 500 + 400 + 300) is obviously better than (-1200 + 300 + 400 + 500) but the payback method rates them equally.

The method is partially a measure of liquidity. It has been called the "fish-bait" test, since it discriminates in favour of quick returns, at the expense of long term projects in which the returns may be higher. (In fact the best investment of all is *no* investment, since payback is then instantaneous).

Its simplicity makes it popular as an initial screen for separating highly profitable projects from obviously unprofitable projects. It should not be used for final decisions between alternatives, especially where there are differences in project life or gestation period.

3.16 RETURN ON INVESTMENT METHOD

Just as annual return on capital may be measured on the business as a whole (section 2.5) so it may be estimated on the individual project. Various measures are used:

Annual profit is taken after depreciation and may be:

- (i) before or after deducting tax
- (ii) the first year's profit, or the profit in the first full capacity year, or some average annual profit over the whole project life.

Capital may be

- (i) with or without working capital
- (ii) initial capital or the "average" capital taken as (initial capital + scrap value)
- (iii) gross or net of tax credit (lump sum depreciation)
- (iv) with or without initial expenditure which is not normally capitalised, e.g. costs of research and development, training, computer programming.
 - (v) with or without capital expenditure after start-up, e.g. on expansion.

If this method is used, it is probably better to take average annual profit before tax, divided by initial expenditure (including fixed capital, working capital and costs of research, etc. whether or not capitalised).

The resulting percentage is compared against the cost of capital (before tax) or some arbitrary standard, with allowance for risk.

Example: Jaydee Ltd. is considering investing in new equipment. The following data is available:

	Present Equipmen (5 years old	
Capital cost	 Rs. 10,000	Rs. 15,000
Written down value	 5,000	15,000
Estimated life	 10 years	10 years
Running hours per annum	 2000	2000
Output per hour (units)	 10	15
Selling price per unit	 Rs. 0/50	0/46
Unit costs – power	 0/03	0/03
consumable stores	 0/05	0/05
materials	 0/22	0/20
wages	 0/05	0/05

The present equipment would realise Rs. 4,000 if sold now, but scrap value should be nil after five years. The proposed equipment is expected to be worth Rs. 7,500 after 5 years and would have no scrap value after 10 years.

The company's cost of capital is 10% p.a.

Ignoring tax, calculate the return on capital

- (i) by the return on investment method
 - (a) on original investment
 - (b) on the average investment
- (ii) by the D.C.F. yield method.

Should Jaydee Ltd. replace its equipment?

(i)	Annual outp				resent nipment 20,000 10,000		Proposed quipment 30,000 13,800
	Less costs -		600	2.0.	10,000	900	15,000
		stores	1000			1500	
		materials	4400			6000	
		wages	1000			1500	
		depreciation*	1000		8,000	1500	11,400
	Annual net p	profit			2,000		2,400

(a) Return on original capital $= \frac{\text{extra annual profit}}{\text{extra capital}} \times 100$ $= \frac{400}{5000} \times 100$ = 8% p.a.

(b) Return on average capital $= \frac{\text{extra annual profit}}{\text{proposed capital exp.} - \text{present capital exp.}} \times 100$ $= \frac{400}{7500 - 5000} \times 100$ = 16% p.a.

* Some users of this method argue whether depreciation on the present or proposed equipment should be adjusted in some way to allow for the Rs. 4000 scrap value realised if the present equipment is replaced. The argument is sterile as the decision to replace or not to replace should not be based on book entries for depreciation.

(ii)	Now	Years 1–5 Inclusive	Year 5
Capital cost	-15,000		+7500*
Scrap value on present	+4000		
equipment Extra revenue	7 4000	+ 3800	
Extra power		-300	
" consumable stores		-500 1600	
" materials		-1600 -500	
,, wages	11.000	+ 900	+7500
Incremental cash flows Present value factors at 10%	-11,000 1.0	3.791	0.621
Tresent value factors at 10/0	1.0	(per table	
		B)	A)
Present values	-11,000	+3412	+4657
Net present value @ 10%	BITTE THE YES	-2931	Skould Jeva
Present value factors @ 2%	1.0	4.713	0.906
		(per table B)	(per table A)
Present values	-11,000	+4242	+6795
Net present value @ 2% (found by trial and error)		+ 37	

^{*} The period common to both alternatives is 5 years, but this leaves one alternative with equipment still having considerable value: this value is therefore credited as a cash flow at the end of year 5.

Conclusion: The replacement equipment earns only 2% against a cost of capital of 10%. Therefore it is better to continue with the present equipment, at least for the time being (Replacement can be re-evaluated in a year's time).

The return on investment method in this case considerably overstates the true return; the return on average investment method even makes the replacement appear profitable.

In the example in 3.9, the rate of return before tax would be 19% p.a. as follows:

= 7000 cash flow, less 3600 (18,000 ÷ 5) depreciation = 3400 annual profit. $\frac{3400}{18000}$ x 100 = 19%

This compares with a D.C.F. yield of 27% before tax. (The rate of return after tax in this case appears to be negative (3400 - 3500 tax), and cannot be compared with the 17% net of tax yield?

The return on original capital method usually under-estimates the true profitability. This in itself would not affect the selection of projects since the required standard could be set correspondingly lower. However the under-estimation is greater in short term projects, and in projects with high tax allowances (which are usually in the early years), i.e. the method discriminates against these projects. Also, since it does not consider the timing of cash flows, it fails to discriminate against projects with long gestation, or slow build up. The return on average capital usually over-estimates the true profitability. It can be seen from the example in 3.11 that the average capital outstanding is not half the original outlay, because the returns are not at an even rate.

Both the variations are still widely used, however, partly because the arithmetic is simple, but mainly due to ignorance of D.C.F. methods. In U.K. it is believed that one of the reasons that industry has not modernised its equipment and remained competitive with other European nations is that firms apply incorrect methods of evaluating equipment proposals; often a cost-reducing replacement would be justified by D.C.F. return, but is turned down because of an apparently low return on investment (unlike the example above). (See "Investment Appraisal" by National Economic Development Council, HMSO, 1967).

3.17 AVAILABILITY OF ALL RESOURCES

There is no purpose in evaluating a proposal if the resources required are not or will not be made available at the time and place required. Moreover if a "paper proposal" were accepted, considerable losses could occur before it became apparent that some essential factor was missing. A good many plans come to grief because they are expressed in financial terms but (i) the necessary *physical* inputs are not defined, and (ii) the supply of each input has not been investigated.

Financial evaluation is not an academic exercise; it must deal only in practical realities. Therefore the management accountant must in the course of his investigation satisfy himself on the following points in respect of the proposal *and* any reasonable alternative:

- (i) for the sales output expected are the physical inputs defined? e.g. materials (grade, quantity, delivery point), labour in each required grade or skill, contract services, space, power, machinery and equipment, spares etc.
- (ii) are the "conversion factors" from input to output reasonable? Are those who will be responsible willing to accept them as attainable standards?
- (iii) are the inputs programmed over time? e.g. broken down by month required.
- (iv) who is responsible for the supply of each input? Has he investigated his sources and positively confirmed he can provide the programmed quantity at the programmed time and place?
- (v) given that the physical resources are available, are *financial* funds available? (check the liquidity position of the firm as a whole)
- (vi) for all inputs requiring *foreign exchange* can we get necessary clearances? (In many industries this will be the first question).

For a firm operating within a budget, it can often be assumed that resources and funds are available for proposals that come entirely within the budget.

However this is not always true, and is not necessarily true at all for extra-budgetary proposals, so availability should be checked.

3.18 REPORTING TO MANAGEMENT

Having defined the proposal and the most likely alternative(s), checked the availability of all resources, and measured terminal value (or net present value) and yield, the management accountant should report to the manager who is responsible for making a decision. For major proposals affecting more than one function of the firm, this will be the general manager, or managing director, or the chairman of a committee appointed for the purpose.

His report should give a positive recommendation, based on whether the proposal fits the financial objectives of the firm or whether some other alternative fits better. It is not enough to report the facts, and leave the interpretation to the recipient. For instance, the management accountant, in the course of investigating the availability of funds, will have ensured that the *liquidity* of the firm is not imperilled. If the firm aims to increase long term *profitability*, a yield above the cost of capital fits this objective. Thirdly, the management accountant should refer to any special *risk* factors (see section 3.13) and, if he feels competent to do so, provide his own overall assessment of risk. He may be able

to suggest ways of reducing risk by taking suitable precautions (e.g. checking sales forecasts with outside consultants), or of pooling risk (e.g. insurance, underwriting, hedging) or of passing it on (e.g. cost escalation clauses in sales contracts, etc.) Though the managing director should be better placed to assess risk, he will value an independent assessment from someone who has thoroughly explored the area and had face-to-face talks with many of those who will be responsible for the success of the proposal, if implemented.

From his analysis, the management accountant may not feel he can support the proposal as it stands, but some modification or alternative would make it acceptable. It may be prudent for instance, to go ahead but to have a fuller evaluation or re-evaluation at a later stage before the really large commitments have to be made. Thus a risky once-and-for-all decision may be reduced to a series of decisions, so that later decisions have the benefit of better forecasts and assessments. A balance must of course be struck between the reduction in risk and the cost of further evaluation.

The report should be brief and to the point. It should normally start with the recommendation, and then give the reasons for and against.

Cash flow schedules, etc. should not be in the body of the report, but be relegated to appendices.

The report should not be a chronological narrative of what the management accountant has done, or his evaluation procedure. The managing director takes it for granted that the management accountant knows his job.

3.19 EXPAND/CONTRACT DECISIONS

We come now to specific types of proposal. One problem that is frequently met is whether to expand production and sale of some product or service that appears profitable. Expansion that requires new capital investment is considered in section 3.26.

We should expand if this will result in incremental revenue more than incremental cash costs. These costs will include:

- (i) cost of additional materials
- (ii) salaries, wages, overtime and benefits above the existing level
- (iii) additional transport costs
- (iv) additional power, repairs and other services (but not apportionments of existing services).
- (v) additional selling and distribution costs, such as sales commission.

Accountants usually distinguish between fixed costs, and variable or marginal costs. Variable costs are those that are expected to vary proportionately with production (within say $\pm 20\%$ of the normal

level of production). All other costs are called fixed. It will be seen that the incremental cost is much the same as the variable or marginal cost for the extra quantity to be produced, if this is not more than (say) 20% of the existing level. Beyond this, it is dangerous to rely on variable cost. Each cost item should be considered in turn, to assess how it is likely to behave for the proposed expansion. If the expansion involves a second shift, for instance, foremen may have to be doubled up; this is an increase in what is usually classed as a "fixed" cost.

Example: Ceylon Works Ltd., who manufacture a single product, have the following figures on their operations in 1968:-

		Rs.
Direct materials	and at	100,000
Direct wages		60,000
Variable overheads	Asset I. Carl	40,000
Fixed overheads		50,000
Profit	• •	50,000
Sales		300,000

1968 production can be expanded by 20% without extra fixed costs. For an extra Rs. 8,000 fixed costs per year, production can be expanded by 30% and the Sales Manager thinks that the whole of this could be sold at present prices. If the selling price were raised 10% on the other hand, demand will increase by only 5%.

Prepare a statement for management indicating the most profitable course of action.

Any assumptions implied in your answer must be clearly stated (ICAC 6/69)

a limit makeing a C	Ceylon Works Ltd 1969 Profitability Statement						
		increase duction & sales		increase duction & sales	with	5% increase with selling price up 10%	
		Rs.		Rs.		Rs.	
Sales revenue Less Direct		360,000		390,000		346,500	
materials	120,000		130,000		105,000		
direct wages variable	72,000		78,000		63,000		
overheads	48,000	240,000	52,000	260,000	42,000	210,000	
Contribution Less fixed overhead	s	120,000 50,000	ksvirta hnac ter	130,000 58,000	La Prison	136,500 50,000	
Net profit	Rs.	70,000	Rs.	72,000	Rs.	86,500	

A 10% increase in the selling price will have the biggest effect on profit in 1969 despite the small resultant increase in demand.

- Assumptions: (i) no change in unit variable costs or in fixed costs except as stated;
 - (ii) that long run profit will not be adversely affected by the increase in selling price.

Expansion may cause opportunity costs, e.g. use of plant for the proposed product may prevent its present or future use on some other product. The opportunity cost in this case is the lost revenue less the saved costs on the displaced product.

Example: A firm makes two products - A and B. Their cost structure is as follows:

	Bradel 1		В		
Selling price	Rs.	10/-	Rs.	8/-	
Less variable costs per unit:					
materials	2/-		1/50		
labour	2/-		1/50		
variable overhead	1/-	5/-	1/-	4/-	
Unit contribution	SU SU SERVE SIN	5/-		4/-	
Less fixed costs/unit		1/-		1/-	
Net profit/unit		4/-		3/-	

Fixed costs are Rs. 90,000 and have been apportioned between 30,000 of A and 60,000 of B on suitable bases.

The limiting factor is machine capacity. Only 120,000 machine hours are available next year. Product A requires 2 hours per unit and B requires 1 hour per unit.

- (i) Advise management on the most profitable production policy.
- (ii) What is the cost of making 20,000 of A to satisfy the minimum market requirement?

B is more profitable than A and management should make as much B as possible, and as little A as possible.

If production were solely of, B profit would be Rs. 390,000 as follows:

Contribution from B: 120,000 hours @ Rs.4/- per hour = 480,000

Less fixed costs = 90,000

Net profit Rs. 390,000

(ii) If 20,000 of A has to be made (instead of nil):
Incremental revenue = 20,000 @ Rs. 10

Less incremental cost = 20,000 @ Rs. 5

opportunity cost of lost B:
40,000 @ Rs. 4/- contribution/unit

Net cash flow each year

200,000

160,000

160,000

160,000

The cost of making 20,000 of A is Rs. 60,000.

This result can also be obtained as follows:

20,000 of A requires 40,000 machine hours. Contribution from A is Rs. 1/50 per hour less than from B. (Rs. 4/- minus Rs. 2/50). Therefore, loss = $40,000 \times 1/50 = Rs. 60,000$.

If the increased production will be sold and cash realised promptly, the cost of interest on capital (the increased working capital) is usually negligible and can be ignored. If however we are producing for stock, or if customers are given exceptionally long credit terms, interest should be added onto the cumulative cash payments until cash receipts are expected to be received. This will show whether the incremental revenue is sufficient to cover the incremental costs including cost of capital.

Incremental sales are often at a lower price than average. The analyst should ascertain on what terms the additional sales are expected. Sales at the margin may also be more costly, e.g. export sales require additional documentation, which may add to administrative costs.

We should contract production, if the costs saved exceed the revenue lost. This is the reverse of the above, but it should be remembered that it is easier to take on additional staff for expansion than to reduce staff in the case of contraction. Direct labour is usually classed as a variable cost, but the management accountant should ascertain whether the labour hours saved will in fact result in a financial saving. If staff will be usefully deployed elsewhere, while there will be no saving on their wages, it can be assumed that they will be creating additional profits elsewhere; this "opportunity revenue" can be brought in as a cash inflow in favour of contraction. (In practice the additional profits from redeployed staff are often taken as equal to their remuneration).

One reason for temporary contraction is large stocks. In this case, current sales revenue will not be lost provided production is restored to the appropriate level before stocks run out. Costs will be saved not only on temporarily reduced production, but also on reduced storage costs.

A more serious step is *close-down* of a factory or production line. Financially we should close down if the costs saved exceed the sales revenue lost (as before), but personnel and customer aspects will be important, especially if the close-down is expected to be only temporary. Management will consider the effect on employee morale, the possible loss of skilled staff, and the effect on customer goodwill if sales cannot be met from existing stocks.

The costs saved by temporary close down will be more than for mere contraction since further costs become incremental e.g. salaries and wages, maintenance, etc. These will be offset by the additional costs of closing down, such as oiling and covering machinery, disconnecting power, etc. and the costs of re-opening, such as re-employing and training staff.

Permanent close down will avoid all costs directly attributable to the factory or production line closed, offset by the costs of disconnections and dismantling machinery.

Any sale value of machinery and other assets, less selling costs, will be brought in as a cash inflow. Note that the written down value of machinery in the books is ignored since this is a sunk cost, and will have to be written off against profit whether or not the factory is closed.

3.20 MAKE OR BUY DECISIONS

The problem of whether to make a required component or to purchase it from a supplier is simply a problem of how to reduce costs, since revenue is the same in either case.

The firm should make the component itself if the incremental costs of doing so are less than the price that will be charged by an outside supplier including delivery charges (the lowest quotation that meets quality and delivery requirements). The incremental costs of production will include the material cost of the component, any additional labour costs (or loss of labour product elsewhere), additional power and other services. Idle machine capacity, of course, costs nothing, but shortage of capacity may set up opportunity costs.

If the component will require extra tooling or other capital expenditure, the comparison should be made on a long term basis. The period covered should be the life of the tooling, or the period over which the component will be required, whichever is shorter. If the capital cost, interest on capital and costs of materials, labour, etc. are less than the "bought-in" cost, the firm should manufacture the part itself.

The same analysis applies to decisions whether to provide a service oneself, or contract outside, e.g. whether the firm should have its own office cleaners, or buildings maintenance staff, or canteen, etc. compared with contracting with outside firms who specialise in these services.

It might be thought that to buy in a component or service must be more expensive than producing it oneself as the bought-in price includes the supplier's profit and a share of his fixed costs, while the cost of producing it is basically the variable or marginal cost only. If the firm is quoted a price lower than its own incremental cost, both should be closely investigated. It could be that the supplier is a specialist and produces in large volume (at low cost due to economies of scale). On the other hand the supplier may be quoting a cut price to get an extra order. Before accepting, the firm should consider whether the price is liable to increase. It should also consider whether the supply (at the quoted price) is assured over the period required. A third possibility is that the firm's own costs are too high and should be reduced.

Other factors affecting the decision are:

(i) what is the quality of the bought-in component or service compared with the firm's own quality? Will this quality be

- maintained? How much quality is actually required? (Apply value analysis);
- (ii) How reliable is outside supply compared with the firm's own production? e.g. could supply be interrupted by strikes, transport delays, etc.?
- (iii) How flexible is outside supply compared with the firm's own production? Can the order be increased or decreased at short notice?
- (iv) What is the effect on the labour force? If work is contracted out is alternative work available?

3.21 PROCESS FURTHER OR SELL DECISIONS

Many businesses make products which can be sold at different stages of manufacture, and the question arises: which is the most profitable stage to sell at. For instance, a textile manufacturer may sell grey cloth, bleached cloth, dyed cloth, finished cloth or finished garments. A furniture manufacturer may sell kits for do-it-yourself assembly, or finished furniture. A pork butcher may sell hams cured or uncured; and so on.

In each case the decision whether to process a further stage depends on whether the incremental revenue exceeds the incremental processing costs.

Example: A manufacturer of insecticides sold a powder for keeping dogs free of parasites. This sold quite well at Rs. 1/50 per canister. Its variable cost was Rs. 1/- as follows:

Materials		0/60
Canister		0/15
Direct labour	• •	0/25
		1/00

It is proposed to make the powder into a solution and sell it as an aerosol spray. Market research indicates that at a price of Rs. 3/- the demand would be at least as high as before. Aerosol containers would cost Re. 1/- each, and the unit labour cost would go up to 50 cents. Materials would be the same as before, water being free. Should the proposal be accepted?

Incremental revenue per canister	Rs. 3/	1/50		1/50
Less incremental costs: canister direct labour	1/- — 0/50 —	0/15 0/25	0/85 0/25	1/10
Incremental profit per canister			COUNTY OF THE PARTY OF THE PART	0/40

The proposal should be accepted.

3.22 PRICING DECISIONS

If a firm sells in a highly competitive market (e.g. tea), the price is set by the market; the problem for the firm is then not one of pricing, but of how to produce within that price, or how to produce higher-priced varieties, or ultimately, whether to produce at all. Similarly, if there is only one large buyer (or association of buyers) of the product, e.g. the Government, or if the price is set by legislation or by declarations of public policy, the firm has to accept the price as given.

In an imperfectly competitive market, there is some scope for the firm to set its own price, which may for instance be higher than other prices if the firm can emphasise quality differences, e.g. by branding.

Setting a price for a product or service supplied by the firm is a very important decision, affecting the firm's revenue, profits, dividends, and reserves for future expansion. If the price is set too high, customers will be driven into the arms of competition or, in the case of a monopoly, will find substitutes for the product. In the price is set too low, middlemen will purchase the product for resale at prices that customers are willing to pay, thus siphoning off the firm's profit. If the price is set too high or too low, it can usually be corrected; in this case setting a price is a short-term decision. However, price changes are unpopular, especially price increases; it is far better to set a price which will not need correction later. Sometimes a new product has a high initial price which is charged deliberately in order to recover the initial costs of launching the product, such as research and development, tooling, market research and publicity campaigns. The price is dropped later. This makes pricing a part of long term planning, comparable with planning capital asset purchases and replacements.

Setting a price affects not only revenue. Since the price affects the sales volume, it affects also total costs and unit costs, and also the amount of working capital locked up in stocks, debtors, etc. To fully evaluate a price, all these cash consequences should be taken into consideration.

In practice, most firms do not evaluate different prices for lack of reliable forecasts of sales at each price.

3.23 COST - PLUS PRICING

The commonest method of pricing (and estimating for contract tenders etc.) is to take the full cost of a product, add a standard percentage margin ("mark-up"), then adjust the margin if the result appears too high or low in relation to competing products, advertising plans, competitive advertising, etc. Company policy will also take into account expected customer reaction, and public policy such as keeping the cost of living down.

A variant of this method is to apply a higher rate of mark-up to the "conversion cost", which is the full cost minus the cost of materials.

This is based on the idea that the profit should depend on the labour and overhead content of the product, not on the material content.

Many small firms which do not keep proper cost accounts estimate only labour and materials, and add a standard percentage which is expected to cover overheads and make a reasonable profit.

Another "cost-plus" method is to fix the price so that the profit represents a reasonable return on investment. The working capital investment consists of the expected stocks and debtors, less creditors, (only those attributable to the product being priced), and is usually not difficult to estimate. The fixed capital investment consists of plant, buildings, etc. used in the manufacture of the product. If other products are made on the same plant, etc. each asset must be apportioned between products on some basis, such as hours of use. This is inevitably somewhat arbitrary.

Example: A nurseryman sells dwarf conifers as indoor plants at Rs. 60 each. His cost structure is as follows:

Seedling Nursery labour Nursery overhead Administration Selling and delivery	- variable fixed variable fixed	Rs. 10 18 3 5 6 5 3
Net profit		50 10
Selling price	desarigat bits event	60

These plants take up half of his nursery garden which is shown in the books inclusive of greenhouses etc. at Rs. 160,000. Stocks, debtors, etc. attributable to this product, net of creditors, are Rs. 20,000 at the current sales demand of 1000 per annum. What is his profit mark-up percentage if he bases this (i) on full cost?

- (ii) on conversion cost?
- (iii) What is his target return on capital if the selling price is based on this return?
 - (i) Mark-up on full cost = 10/50 = 20%
- (ii) Mark-up on conversion cost = 10/50-10 = 10/40 = 25%
- (iii) Net annual profit = $1000 \times 10 = \text{Rs. } 10,000$ Capital employed $\frac{160,000}{2} + 20,000 = \text{Rs. } 100,000$ Target return on capital = $\frac{10,000}{100,000} = 10\%$ per annum.

Full cost pricing is simple and, if estimated costs and volumes are realised, a profit is made. The disadvantages of full cost pricing are:

- (i) demand is not properly taken into account. Either a higher price or a lower price is likely to increase profit;
- (ii) it does not consider the opportunity costs of factors in short supply. A higher price should be charged for profitable opportunities foregone;
- (iii) it is based on an apportionment of indirect costs which is always arbitrary to some extent. This is serious in a highly developed firm in which overhead rates are high.
- (iv) the fixed cost element in the price depends on expected volume, but the volume depends on the price.

3.24 MARGINAL COST-PLUS PRICING

The marginal cost of a product is the same as its variable cost, viz. the cash cost of making one more unit of product. This is lower than full cost, which includes a share of fixed costs.

It is evident that the price must be at least equal to the marginal cost (unless the product is a "loss leader" to attract greater sales and profits on other products). The marginal cost is a floor level. The firm will then get the best price it can above this minimum. Any excess of price over the marginal cost per unit of producing and selling (or in total the excess of revenue over marginal costs) represents additional profit (or a reduction in loss).

However, in the long term (or for the majority of customers) the average price must at least cover full costs, or the firm makes a loss.

A firm may set a price below full cost in the following circumstances:

- (i) the price at least covers marginal cost
- (ii) this price is to be given only for a limited period or to marginal customers (to be defined), e.g. export customers.
- (iii) there is no possibility of the existing market being spoiled by charges of discrimination or by resale of the product by marginal customers to existing customers, i.e. marginal sales must be additional.
- N.B. In many companies, no discrimination between customers is allowed as a matter of policy and business ethics. However a "marginal price" may be offered to all customers equally, e.g. to clear unsold stocks, or in a trade recession.

Example: The nurseryman in the above example is asked to provide 200 plants at a special price of Rs. 45 for an exhibition in Singapore. Should he accept? The marginal or variable cost per plant is Rs. 36. At a price of Rs. 45 he would therefore make a contribution of Rs. 9 per plant, or extra profit of Rs. 1800.

He should accept provided the sale will not reduce his present market of 1000 a year. (There is a risk that plants may be re-exported to Ceylon after the exhibition and sold at a cut price).

C-11!...

3.25. PRICING FROM MULTIPLE SALES FORECASTS

If sales forecasts can be made for sales at different prices, the management accountant should recommend the price which shows the highest contribution. (Incremental revenue minus incremental costs). (This is not necessarily the same as the price which shows the highest revenue)

Incremental costs should include all future cash costs attributable to the product, including the opportunity costs of resources which are in short supply, but not sunk costs (such as depreciation) or apportionments of existing costs (such as share of office expenses).

Example: A fertiliser distributor sells four fertilisers – basic slag, nitro-chalk, bone meal and potash. The present costs, prices and expected sales of these are as follows:

		Basic slag Rs.	Nitro chalk Rs.	Bone meal Rs.	Potash Rs.
Variable costs per cwt.		16	24	33	44
Fixed costs/cwt.	• •	4	6	7	6
Total cost		20	30	40	50
Profit margin (20% on cost)	• •	4	6	8	10
Selling price per cwt.		24	36	48	60
Volume (cwt)		5000	3000	3000	2000

It is suspected that profits could be improved by varying the profit margin on each product according to the market demand. A sales forecast indicates that the following volumes could be sold at the following prices:

EE

Selling price .		33	49	33	
Volume .	. 4800	3500	2880	3000	
Advise management on the most	profitable	e prices.			
	Rs.	Rs.	Rs.	Rs.	
Contribution per cwt at present					
prices	8	12	15	16	
Contribution at present prices	40,000	36,000	45,000	32,000	
Contribution per cwt at proposed	1				
prices	10	9	16	11	
Contribution at proposed prices	48,000	31,500	46,080	33,000	

The price of basic slag should be increased to Rs. 26. Nitro chalk shows more profit at its present price. Bone meal should be raised to Rs. 49. Potash is more profitable on a price reduction to Rs. 55.

Note (1) Fixed costs do not enter the evaluation at all since they are the same for any sales mix or volume (within limits).

(2) Higher contribution and profit does not always go with higher revenue. Revenue at present and proposed prices is as follows:

Present: .. 120,000 108,000 144,000 120,000 Proposed: .. 124,800 115,500 141,120 165,000

It can be seen that nitro-chalk revenue goes up while its contribution goes down, and bone meal revenue goes down while its contribution goes up.

It is true that revenue can be increased by increasing the prices of products with inelastic demand, and decreasing the prices of products with elastic demand, but this does not imply higher profit also. It is necessary to calculate the contribution in each case.

Terms of sale, such as quantity discounts, delivery terms, repair guarantees, etc. may be evaluated the same way, by comparing incremental revenue and incremental costs. Quantity discounts are often given where the firm can save costs by producing in a long run to meet a single order. The discounts offered should not exceed the cost savings.

3.26 NEW ASSET PURCHASE DECISIONS

All incremental costs and revenues attributable to the decision to purchase should be scheduled according to the years of payment and receipt, and the opportunity cost of capital calculated from year to year. If the net sum of these cash flows (terminal value or net present value) is positive, then it is better to purchase than not to purchase. If there is any special risks as to whether the returns will accrue as forecast, the yield must be sufficient to cover this risk, as well as the normal cost of capital. (It may be still better of course to purchase a different make or capacity of asset, or earlier or later, or rent instead of purchase if this option exists, etc.)

Care should be taken to include all costs associated with the decision. For instance a machine will usually entail maintenance. Heavy machinery may need site preparation and installation costs. The purchase of land will require professional services, stamp duty, etc. A computer will require, inter alia, programming costs, air-conditioning, preparation of initial files of data, re-training and relocation costs of displaced staff, etc. Some of these costs are significant; if they are overlooked wrong decisions may be made.

Where the benefits of a capital project cannot be evaluated, e.g. a canteen to provide free meals for staff, the management accountant should still evaluate the costs, and search for better alternatives, assess the risk of costs escalating, and check the availability of all resources required. Management cannot (or should not) approve a project merely on the ground that it will improve employee morale. The minimum information they need is a cost estimate from the management accountant, and an assessment of the effect on employee morale (or any other non-quantifiable benefit) from the personnel manager: they can then form a balanced judgement of whether the benefit is worth the cost.

In the case of the proposed canteen the management accountant might ask:

- (i) how many employees will it serve? how many will use it? between what hours? can the peak be handled?
- (ii) what will be the initial cost of equipment, installation, hiring of staff, etc. the fixed costs per year and variable cost per meal served? how much will the employee pay and how much is subsidised?
- (iii) what is the comparable cost of a meal outside? or of a service provided by a contractor?
- (iv) how can meals be supplied more economically?

With regard to the benefit, though this cannot be directly quantified, it may be relevant to ask the personnel manager whether the canteen will reduce staff turnover (this will save staff selection and training costs) and/or improve productivity.

Even where certain assets have to be provided by law, e.g. guards on moving machinery, there may be alternative ways of meeting the requirement; if there are significant differences in cost the management accountant should investigate.

3.27 REPLACEMENT ASSET PURCHASE DECISIONS

An asset should be replaced when the savings and/or extra revenue from a new asset exceeds the cost of purchase.

Suppose our present machine will last 5 years, but with steadily mounting repairs and steadily reducing productivity because of breakdowns, we expect the following cash flows (ignoring tax):

	Year	Year	Year	Year	Year	Year	Check
	0	1	2	3	4	5	Column
Revenue		+1,500	+1,300	+1,100	+1,000	+900	+5,800
Materials etc.		-750	-650	-550	-500	-450	-2,900
Repairs		-100	-200	-350	-450	-450	-1,550
Total		+650	+450	+200	+ 50	Nil	+1,350

A new machine would cost 1,700, would last 5 years, and is expected to provide the following cash flows:

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Check Column
Capital cost Revenue Materials, etc. Repairs	-1,700	+1,600 -800	+1,600 -800 -20	+1,600 -800 -50	+1,600 -800 -50	+1,600 -800 -100	-1,700 +8000 -4,000 -220
	-1,700	+800	+780	+750	+750	+700	+2080

The increment or difference between these alternatives (new machine minus old machine) is as follows:

$$-1,700 + 150 + 350 + 550 + 700 + 700 | +730$$

Suppose the cost of capital is 10%. We can now judge whether the savings and extra revenue are sufficient to justify the incremental costs.

This shows that after 5 years we will be 57 better off as a result of replacing the asset now. (This is subject to the risk of not getting the expected improvement in productivity and reduction in repairs).

This is a simplified example. In practice tax consequences should be included (these will tend to favour continuing with the old machine since repair costs are chargeable to tax and are thereby reduced by 50% whereas the machine will typically get a tax credit of only $33\frac{1}{8}\%$ ($66\frac{2}{3}\%$ lump sum depreciation @ 50% tax rate).

Also this problem has been simplified by assuming that the remaining life of the old asset is the same as the life of the new asset. If the new asset had an expected life of, say, 7 years, it would not be correct to stop at 5 years, since, in the case of replacement, we would have an asset with two years' life remaining. This may be allowed for by entering in the cash flows for replacement the estimated scrap value of the new asset after 5 years (see example in section 3.16) or by making assumptions about a succession of replacements to infinity, and finding which alternative shows the higher present value.

Notice particularly that the written down value of the present asset nowhere enters the comparison. This is a sunk cost; whether it is written off immediately on scrapping, or whether we continue with the old asset and write it off over 5 years, it has the same total impact on book profits, and no effect at all on the future bank balance.

The appropriate time to replace an asset, may be found by comparing the differential cash flows for replacement now (as above) with the differential cash flows for replacement after 1 year, and seeing which shows a higher terminal value (or net present value). Then compare replacement after 1 year with replacement after 2 years, etc. If the cost of breakdown is high, it may be more economic to replace at a certain age instead of waiting for breakdown.

3.28 RENT OR PURCHASE DECISIONS

Having evaluated an asset and found that it is better than not having the asset, we may then consider whether renting is better than purchasing outright. This applies to land, buildings, ships, computers and an increasing variety of plant and equipment.

We should purchase an asset rather than rent it if the rentals saved exceed the purchase price, with interest on the difference. If there are any other cost or revenue differences between purchasing and renting,

these should be brought into the comparison, e.g. if a computer is rented, the rental includes maintenance, so we should include the cost of a maintenance contract in the purchase option.

Example: A feasibility study shows that we should acquire a certain computer configuration. The basic price is Rs. 1,530,000, but freight, insurance, 55% FEEC premium and duty add a further Rs. 1,320,000. If the computer is purchased, an 80% lump sum depreciation allowance will be made on the total landed cost. A maintenance contract would cost Rs. 70,000 a year, and it is expected that the installation will be due for replacement after 7 years.

If the computer is rented, the basic price is converted to a rental of Rs. 353,000 a year, which includes maintenance. The Rs. 1,320,000 FEEC, duty etc. is still payable at the outset and may be written off against profits for tax purposes over the period of lease. The rate of tax is 50% (assume 1 year lag in payment) and the cost of capital is 10% p.a. net of tax.

Is it more economic to purchase or rent?

PURCHASE (Rs. 000) Capital cost Cash value of	-2850	Year Y	ear Y	ear Y	Year 4	Year 5	Year 6	Year 7	Year 8	Check Total -2850
LSD allowance 80 % x 2850 x 50 Maintenance Tax relief on		+ 1140 -70	-70							+ 1140 -490
maintenance			+35	+35	+ 35	+ 35	+35	+35	+35	+245
Net cash flows							7			
excl. other co and benefits	-2850	+1070	-35	-35	-35	-35	-35	-35	+ 35	-1955
RENT										2.2
FEEC duty, et Tax relief on	c1320)								-1320
above Rental		-353				+94 -353			+94	+658 -2471
Tax relief on rental			+177	+177	+177	+177	+177	+177	+177	+1239
Net cash flows										
(excl. other cos and benefits)	-1320	-353	-82	-82	-82	-82	-82	-82	+271	-1894
PURCHASE 1	MINUS	S RENT								w.
Net cash flows	-1530	+1423	3 +47	+47	+47	+47	+47	+47	-236	-61
			and the second		* *		,*		1	11:

It can be seen that the terminal value is negative even without adding in the 10% cost of capital. The rentals saved are insufficient to justify purchase. On the assumptions above, it is far more economic to rent.

TYPICAL EXAMINATION QUESTIONS

These questions are divided for convenience into 3 sections -

Questions 1- 9 Evaluation of current expenditure

10-24 Evaluation of capital expenditure

25-34 Evaluation of prices, policies etc.

Questions on evaluation of current expenditure

- 1. "Costs for decision-making should be in opportunity cost terms..... Imputed opportunity costs are rarely included in the costs provided by a costing system. There can be little doubt that this neglect of opportunity cost has led to misguided decisions." An industrial client has read this passage in an article in a technical journal and asks you to explain it. Set out, in the form of a letter to the client, your explanation and the relevance of the subject to your client's business. (ICA Final 11/68)
- 2. Management are often faced with the situation where a component which is manufactured by their own organisation has a cost, as disclosed by the cost accountants, in excess of that which would have to be paid if it were bought on the open market. However a decision to discontinue manufacture and buy in cannot be made simply by comparing internal costs with external buying prices. Discuss the other factors which management would have to consider distinguishing clearly between those of an accounting and a non-accounting nature.

 (ACCA/IV/12/67)
- 3. A manufacturing process on a continuous operation achieves an output of 4 tons per hour valued at Rs. 100 per ton. Process wages cost Rs. 50 per hour and raw material Rs. 20 per ton of product. Regular maintenance amounts to Rs. 1000 per week. Breakdowns averaging 25 hours per week occur due to mechanical faults which cost Rs. 10,000 to repair. These could be reduced or eliminated if additional maintenance on the following scale were undertaken:

Breakdown hours 0 5 per week 10 15 20 Rs. Rs. Rs. Rs. Rs. 32,000 Maintenance costs 16.000 8.000 4.000 2,000 Repair costs 0 3,000 4,000 6,000 8.000 Process labour during stoppages can be used elsewhere up to 10 hours per week.

Tabulate the information provided to show:

- (a) the optimum amount of maintenance to undertake each week;
- (b) the additional revenue obtainable at the level compared with the present situation. (Adapted from ICWA/IV/(1)/5/68)
- 4. Your company plan to operate department D at normal capacity next year producing 100,000 units of product P. Assuming no defective work, these units can be manufactured in 250,000 labour

hours at a cost of Rs. 2/- per hour. Factory overhead would amount to Rs. 600,000 of which Rs. 200,000 would be fixed. Five units of material M will be used in each unit of product P. Materials can be purchased in two qualities; a high quality at Rs. 4/20 per unit or a lower quality at Rs. 3/33 per unit.

Under expected conditions, using high quality materials, 10% of the work will be defective requiring complete replacement of the materials, additional labour costs and variable overhead. Scrap materials recovered from defective production could be sold at Rs. 1/20 per unit of high quality material used.

As an alternative to this arrangement, the use of the lower quality material is being considered but this would require an extra operation to be performed on it. An additional machine and tooling would be needed at a cost of Rs. 12,000 per annum. The additional operation would take half an hour for each unit of product P produced, not taking defective work into account. It is estimated that 20% of the work would be defective all of which would require complete replacement. Scrap materials from the lower quality material could be sold for Rs. 20,000.

Present information to management indicating the more profitable course of action. (Adapted from ICWA IV 12/67)

5. The Excelsior Company makes three sizes of drill – Big, Medium and Small. The plant is working near maximum capacity and demand for all three is constrained by production. The Budget Committee is informed that demand for all three will continue. The plant and equipment is equally suitable for any of the three drills but the Big size takes 60 minutes of machine time whereas the Medium size takes 30 minutes and the Small size 20 minutes. Prices and cost data are as follows:

		Big	Medium	Small		
Selling price		Rs. 50	Rs. 40	Rs. 30		
Material cost		15	14	12		
Direct labour cost		9	11	7		
Direct machine time cost		6	3	2		
Advise the Budget Committee on the future production program.						

6. Your factory produces two products, A and B, and the costing for the products at the moment is as follows:-

Output	Product A 100,000 units	Product B 100,000 units
	Rs.	Rs.
Prime Cost	20,000	30,000
Variable Overheads	10,000	20,000
Allocation of Fixed Overheads	10,000	5,000
Total Cost	40,000	55,000
Sales Value	41,000	65,000
Profit	1,000	10,000

With a view to increasing profits your Managing Director wishes to stop the production of product A, double the output of product B and market it at a $2\frac{1}{2}$ % discount. You as the Cost Accountant of the firm are required to write a report to him showing how the profitability of the Company will be affected by this move, and giving him your recommendations on his proposal.

(Adapted from CTC Diploma Exm. '62)

7. A manufacturing company produces three products X, Y and Z, by passing materials through two departments, A and B. In a time of expanding trade, the management accountant is asked to provide information to illustrate the relative profitability of products. The company has adequate finance, materials can be obtained well in excess of maximum requirements, and plant and machinery are available for additional work in both departments.

Standards per unit are as follows:

Product		X	Y	Z
Material costs (rupees)		56	48	55
Labour hours:			MERCE	P. Belleville
Department A		2	3	1
Department B		2	1	3
Selling price (rupees)		180	150	200
Other budget figures are:				
Department		A		В
Direct labour wage rates				
(rupees per hour)		5		6
Direct labour hours per annun	n	80,000		120,000
Overhead costs per annum:				
Variable		Rs. 480,000	Rs.	1,200,000
Fixed		Rs. 480,000		2,400,000

Present information, and make recommendations to management.

(Adapted from ICWA: 12/64)

8. The annual flexible budget of a company is as follows:

Production capacity Costs:	••	40% Rs.	60% Rs.	80% Rs.	100 % Rs.
Direct labour		16,000	24,000	32,000	40,000
Direct material		12,000	18,000	24,000	30,000
Production overhead		11,400	12,600	13,800	15,000
Administration over -					
head		5,800	6,200	6,600	7,000
Selling and distribution					
overhead		6,200	6,800	7,400	8,000
		51,400	67,600	83,800	100,000

Owing to trading difficulties the company is operating at 50% capacity. Selling prices have had to be lowered to what the directors

maintain is an uneconomic level and they are considering whether or not their single factory should be closed down until the trade recession has passed.

A market research consultant has advised that in about twelve months' time there is every indication that sales will increase to about 75% of normal capacity and that the revenue to be produced in the second year will amount to Rs. 90,000. The present revenue from sales at 50% capacity would amount to only Rs. 49,500 for a complete year.

If the directors decide to close down the factory for a year it is estimated that:

- (a) the present fixed costs would be reduced to Rs. 11,000 per annum;
- (b) closing down costs (redundancy payments, etc.) would amount to Rs. 7,500;
- (c) necessary maintenance of plant would cost Rs. 1,000 per annum;
- (d) on re-opening the factory, the cost of overhauling plant, training and engagement of new personnel, would amount to Rs. 4,000.

Prepare a statement for the directors, presenting the information in such a way as to indicate whether or not it is desirable to close the factory.

(Adapted from ICWA: June 67)

9. A gift token scheme is being introduced to expand the sales of two brands of household cleaner.

One token will be attached to each bottle and the customers will stick the tokens into books each holding one hundred tokens. Two completed books will entitle the collector to a gift costing the company Rs. 20/- including distribution, packing and postage costs. Additionally the sender of each two completed books will be entitled to enter for a competition, with prizes of Rs. 50,000; Rs. 20,000; Rs. 10,000; Rs. 5,000; 10 of Rs. 200 each; and 50 of Rs. 100 each.

Before the introduction of this scheme the product forecasts for the ensuing year are as follows:

Sales, millions of bottles	 N brand	S brand
Production cost:		
Variable, per bottle	 Rs. 2/00	Rs. 2/50
Fixed, per bottle	 Rs. 1/00	Rs. 1/50
Selling cost:	**	
Variable, of selling price	 10%	10%
Fixed, per bottle	 Rs. 0/50	Rs. 0/50
Selling price, per bottle	 Rs. 5/00	Rs. 5/50

The estimated costs of administering the prize scheme are:

Advertising, distribution, etc.		Rs.	300,000
Books for tokens		22	20,000
Tokens, per million			10,000

It is expected that 5% of the tokens will not be retained by the purchasers and 25% will be held in uncompleted books when the scheme ends.

- (a) Prepare a statement showing the additional profit expected from the scheme if sales of both products increase in the year by 10%.
- (b) An alternative put forward to the gift token scheme is to achieve an increase in sales by a reduction of selling price. It has been estimated that a reduction which would achieve a 10% increase in sales would also increase the existing profit by 10%. Calculate the amount of this reduction in the selling price per bottle. (Adapted from ICWA IV 12/68).

Questions on evaluation of capital expenditure

10. The Alpha Company Ltd. are considering the purchase of a new machine which will cost Rs. 400,000. It is estimated that the machine will have a life of seven years at the end of which it will have a scrap value of Rs. 10,000. This will also involve an investment in working capital of Rs. 100,000. The net cash flows (before tax and excluding working capital changes) which this will produce are as follows:

Year	1	4.			Rs	. 100,000
	2		10.488		,,	100,000
	3	10.07			,,	140,000
	4				,,	130,000
	5			• •	,,	110,000
	6		CARAMBES		,,	120,000
	7	A	114.309	S#83#3	22	100,000

The company has a target return on capital of 15% and on this basis you are required to prepare a statement evaluating the above project.

Taxation: Assume the following:

- (1) Income Tax 50%
- (2) Lump sum investment allowance 80%
- (3) Tax payable one year in arrears.

The company carries on other trading activities from which it derives taxable profits.

Note: The present value of Re. 1/- at 15%

```
Rs. 0.870
due after one year
                              0.756
      two years
                              0.658
      three
                              0.572
      four
      five
                              0.497
                              0.432
      SIX
                              0.376
      seven
                              0.327 (Adapted from ACCA-12/66)
      eight
```

- 11. The MN Company Ltd. has decided to increase its productive capacity to meet an anticipated increase in demand for its products. The extent of this increase in capacity has still to be determined and a management meeting has been called to decide which of the following two mutually exclusive proposals I and II should be undertaken. On the basis of the information given below you are required to:
 - 1. evaluate the profitability (ignoring taxation) of each of the proposals and
 - 2. on the assumption of a cost of capital of 8% advise management of the matters to be taken into consideration when deciding between Proposal I and Proposal II.

Capital Expenditure	I	II
Buildings	 50,000	100,000
Plant	 200,000	300,000
Installation	 10,000	15,000
Working Capital	 50,000	65,000
Net Income		
Annual pre-depreciation profits (Note (i))	 70,000	95,000
Other Relevant Income/Expenditure		
Sales Promotion (Note (ii))	 -	15,000
Plant Scrap Value	 10,000	15,000
Buildings Disposable Value (Note (iii))	 30,000	60,000

Notes (i) The investment life is 10 years.

- (ii) An exceptional amount of expenditure on sales promotion of Rs. 15,000 will require to be spent in year 2 on Proposal II. This has not been taken into account in calculating predepreciation profits.
- (iii) It is not the intention to dispose of the buildings in ten years time, however, it is company policy to take a notional figure into account for project evaluation purposes.

The present value of Rs. 1 due 1 year	hence at 8% =	0.926
2	, =	0.857
3	mest said signature.	0.794
shakatatarahalgaraha anta 4	a military. Year - ma	0.735
5	4 · · · · · · · · · · · · ·	0.681
6	=	0.630
7	=	0.583
8		0.540
9	= (20.00.000.000.000.000.000.000.000.000.0	0.500
10		0.463
11	W	0.429
	Adapted from ACCA	-12/67)

12. Prepare a report for management commenting on the advantages and disadvantages of the discounted cash flow approach to the

evaluation of investment opportunities compared to the more traditional approach such as payoff or return on original investment.

(ACCA-6/66)

13. The discounted cash flow methods of evaluating investment opportunities do not explicitly take account of uncertainty. Discuss the factors which you would consider in assessing uncertainty and how discounting can be used to take account of these.

(ACCA-6/67)

14. A firm which manufactures and hires out mechanical excavators expects to sell a large number of a new type of excavator, which has been developed by the parent company. Before selling, however, the firm has to train engineers to repair and maintain the excavators, and it is estimated that in 1970, five trained engineers will be required, and eight in 1971. There are training facilities at the parent company's factory in India for which there would be a charge of Rs. 200/per man per day. The course lasts ten working days, but takes altogether 14 days because of travel and a mid-course break. Travel expenses and accommodation and living allowances are expected to be Rs. 3000/per man.

There is strong pressure from the Engineering Division to purchase an excavator and train engineers on it locally. The excavator would cost Rs. 130,000/- and operating costs, excluding depreciation, would be Rs. 4000/- a year. Its working life is estimated at five years, with a scrap value of Rs. 10,000/-. Also there would be the cost of education facilities as follows:

- (1) Instructor (local) Rs. 2000/- per month.
- (2) Hire of Classroom Rs. 100/- per week.

When the Instructor is not engaged on the above course, he would return to servicing the present line of excavators.

The firm could make 5% on money to be used for purchasing an excavator for training.

Should it purchase, or send trainees to India? Comment on your answer.

Ignore taxation and inflation.

- 15. A feasibility study shows that we should acquire a certain computer configuration. This can be rented for 12,000/ year (including maintenance) or purchased outright for 30,000, in which case maintenance would cost an extra 1200/year. We expect to use the system for 5 years. Assume 50% company tax, 50% lump sum depreciation, no other capital allowance, and 1 year lag in tax payments. Cost of capital is 5% net. Should we rent or buy? State your assumptions. If we expected 5% annual inflation over the next 5 years how would this affect your conclusion?
- 16. What are the advantages and disadvantages of the following methods of assessing the profitability of capital projects:

- (i) rate of return on initial capital (before tax)
- (ii) payback
- (iii) discounted cash flow present value
- (iv) discounted cash flow yield.
- 17. A tea company is considering purchasing additional tea factory machinery in order to reduce costs and improve quality. It ascertains from the Tea Controller that the Government will give a grant of one third of the cost (excluding installation), and pay also half the interest on a loan from the State Mortgage Bank for the remainder of the cost. Tax allowances are lump sum depreciation (66\frac{2}{3}\%) and development rebate (40\%). The full interest is allowed as a deduction from income for tax purposes (even though half the interest is subsidised by Government). The grant and interest subsidy are exempt from tax. Assume tax is paid one year in arrears and that profits are sufficient to use all grants and allowances. The rate of tax is 50\%.

The machinery is expected to cost Rs. 240,000, plus Rs. 10,000 installation. It would be installed January 1970 and is conservatively expected to reduce the cost of production (excluding depreciation and interest) by 2 cents a pound, and improve the net sale average by a further 3 cents a pound. Production is 1 million pounds a year, and the machinery is expected to last 20 years and have no material scrap value.

A loan could be obtained from the State Mortgage Bank at 9% p.a. This is repayable in 5 annual instalments.

The company's average return on equity capital is 10% p.a.:

- (i) Should it purchase the machinery?
- (ii) What is the minimum additional profit per lb. to break even?
- 18. A machine manufacturer provides the following cost comparison between the machine he desires to sell, and the machine at present in use by your firm:

	Proposed Machine Rs.	Present Machine Rs.
Capital cost (10 years life)	40,000	
Written down value (6 years remaining life)		12,000
Output per year (articles)	40,000	30,000
Costs — wages	2,800	4,800
other variable	4,800	5,800
depreciation	4,000	2,000
interest @ 10%	4,000	1,200
	15,600	13,800
Divided by output, gives cost per article	0/39	0/46

Evaluate the above, and give your recommendation on whether and when the present machine should be replaced. The article is sold for 50 cents. The cost of capital is 10% p.a. It may be assumed that all costs and lives are as given by the machine manufacturer. Ignore tax, scrap values and the possibility of any alternative machines.

19. The management of a factory propose to replace existing road vehicles used for transporting liquid products by installing a pipeline. It is desirable because of operating difficulties to use large diameter pipes but the cost of installation and maintenance increases more than proportionately to the increase in the size of the pipe installed.

The following details apply:

Pipeline size	3"	4"	5"	6"	7'
Investment required (Rs. 000)	16	24	36	64	150
Gross annual savings in operating costs before deduction for depreciation and tax (Rs. 000)	20	25	30	35	32
depreciation and tax (Rs. 000)	20	23	30	22	32

The installation is to be depreciated over 10 years on the straightline method.

You are to assume that taxation is 50% of savings, payable one year in arrears, and lump sum depreciation allowance is $66\frac{2}{3}\%$, receivable in the year following the year of expenditure.

Recommend to management the size of pipeline that should be installed to optimise investment if 15% net after tax is the minimum acceptable return. (Adapted from ICWA IV 12/67)

20. As chief accountant you are asked to approve capital expenditure of Rs. 250,000 on the purchase of a crankshaft grinding machine. The proposal states that this machine will replace an existing machine which is badly worn and obsolete.

The new machine would give a superior micro finish and would save twenty minutes on each crankshaft ground (a reduction from 35 minutes to 15 minutes). As 5,000 shafts are at present ground in a year, the annual saving claimed in support of the proposal is 5,000 x 20/60 hours at Rs. 30/- per hour (direct labour cost Rs. 10/- plus absorption of works overhead at 200%): total of Rs. 50,000 per annum, giving a five-year pay-off.

- (a) Do you consider so far as its financial implications are concerned that this proposal is fully and correctly justified? If not, explain why and state what other information you would require before coming to a decision.
- (b) What courses of action could you suggest as alternatives to the immediate purchase of the machine specified?

 (Adapted from ICWA 6/67)
- 21. A factory's product range includes 'Product A', which sells at a loss. The calculation of this loss, and other relevant data, are given below:

Salling Dries mandant A man amit	Rs.	Rs.
Selling Price, product A, per unit		2,000
Costs: Variable	 1,500	
Fixed: specific to product A	600	
general to factory	 800	2,900
Loss per unit		(Rs. 900)

The total fixed costs specific to product A will be Rs. 30,000 per annum for the next three years and will then be discontinued with the termination of the manufacture of the product.

The forecast sales values of product A for the next three years are as follows:-

		Rs.
Year 1		120,000
2	 	80,000
3		25,000
Thereafter	 	Nil

Existing stocks and work-in-progress at book value (variable cost) amount to Rs. 80,000.

The factory has a stock of service spares for product A amounting to Rs. 180,000 at variable cost (equal to 55% of sales value). Future sales of these at selling prices will amount to Rs. 42,000 per annum for three years and Rs. 18,000 per annum for a further three years. After this the business will probably fade away.

A competitor has offered to take over the manufacture and sale of product A, including the related spares business, on the following terms:

Rs. 20,000 down payment for manufacturing rights.

A royalty of 5% on total sales, including spares, achieved during the next three years.

Stocks and work-in-progress to be taken over and paid for immediately, production stocks at variable cost and spares stock at an agreed valuation.

At what minimum valuation of spares stock do you consider that this offer could be accepted?

(The cost of finance to the company may be taken as 8% per annum. Taxation is to be ignored.)

Present value of Re. 1/- (assuming that the Re. 1/- is received in a single payment on the last day of the year)

After	8%
1 year	.93
2 years	.86
3 years	.79
4 years	.74
5 years	.68
6 years	.63

(Adapted from ICWA 6/67)

22. Vesta Ltd. makes scientific instruments. It relies on its own research department to suggest possible new products. The company budgets to spend about 5% of its turnover on research department salaries; the department is required to undertake general research if it is not fully occupied in the development of specific projects. The average salary rate plus benefits in the research department is Rs. 12/50 per manhour.

Early in 1966, a proposal was received for the development of a new product, the "Elektrap". The board instructed the research department to carry out a preliminary feasibility study, which cost Rs. 50,000, and this produced the following information:

- (a) The development could be started immediately and the company could then start production on 1st January, 1967.
- (b) 20,000 man-hours of the research department time would be needed.
- (c) The development would require additional cash expenditure in the works of Rs. 85,000 on special equipment.
- (d) Sales potential for the first three years is estimated at:-

1967	 2000	units
1968	2500	units
1969	 2000	units

It is the company's policy to assume (for the purpose of project appraisal) that no sales will be made after three years because rapid technological progress in the industry commonly causes early obsolescence.

- (e) Competitive considerations would cause the company to set its selling price at Rs. 200 per unit. Variable costs per unit would be: materials Rs. 90; and direct labour 12 hours at Rs. 5/- per hour. Overhead expenses of the company would not be altered by the manufacture of this product.
- (f) One machine of Type XL 120 would be required for the manufacture of "Elektraps". One is already owned by Vesta and used in the manufacture of a product which is to be discontinued on 31st December, 1966; there would be no other use for this

machine within the company. Its book value at 31st December, 1966 (cost less depreciation) will be Rs. 48,000, though if it were then sold it would fetch Rs. 55,000; a precisely similar machine could be purchased for Rs. 60,000. The machine at present owned would, if used, be expected to have a scrap value of Rs. 5,000 on 31st December, 1969.

The manufacture of "Elektraps" would also require some time on a machine Type WL 200, one of which is also owned by Vesta. Other products will in any event use 70% of the capacity of this machine and the remaining 30%, which would otherwise remain unused, is just sufficient for the requirements of "Elektrap" production. Machine WL 200 will have a book value of Rs. 25,000 at 31st December, 1966; it could then be sold for Rs. 15,000. Another exactly like it could be purchased for Rs. 20,000. The machine already owned would in any event have no residual value at 31st December, 1969, as it will by then be obsolete.

You are required to make a calculation showing whether manufacture of "Elektraps" is worthwhile. Add a brief note describing any considerations not reflected in your calculation which management should weigh in taking a decision. Assume that the cost of capital of Vesta Ltd. is 10%; also that, as a reasonable approximation, the development cost under (c) is all incurred on 1st January, 1967 and cash receipts from sales and payments for variable costs arise on 31st December in each year. Ignore taxation.

Compound	interest	table 10 per	cent
n	an	V _n	Sn
1	0.9091	0.9091	1.000
2	1.7355	0.8264	2.100
3	2.4869	0.7513	3.310
4	3.1699	0.6830	4.641
5	3.7908	0.6209	6.105
10	6.1446	0.3855	15.937
20	8.5136	0.1486	57.275

Note: The symbols have the following meanings:

- n number of years.
- an present value of Re. 1/- receivable at the end of each of n years.
- v_n present value of Re. 1/- receivable at the end of n years.
- s_n amount of Re. 1/- receivable at the end of each of n years.

 (Adapted from CMI: 10/66)

For a 5 acre coconut smallholding, the following costs are 23. anticipated.*

2,000 Rs. House 395 at initial planting then Rs. Plants 270 over the next 6 years Rs. 360 Rs. Lining etc. 500 Rs. Fencing 500 at start then Rs. 480/- over the Rs. Weeding, watering etc. next 6 years then Rs. 298/- a year thereafter 250 over first 6 years Rs. Pest prevention 800 over first 6 years, then Rs. 103/-Rs. Manuring a year thereafter. 200 over first 6 years then Rs. 76/-Rs. Other costs a year thereafter.

A coconut tree takes about 7 years after planting to yield. annual yield could be anything between 500 and 5000 nuts per acre. An average is 2000/ acre, or 10,000 from 5 acres. These are expected to fetch Rs. 1,600.

Assuming a tree yields for 50 years, assess the DCF yield on coconut smallholding. Ignore tax and inflation.

- *Data from Ceylon Coconut Quarterly, April and September, 1951, and "Agricultural Credit in a Developing Economy - Ceylon" by Dr. Tilakaratne. Prices are as at 1950.
- You have been asked to advise a manufacturer who is making a 24. product which has very limited, though steady, sales amounting to Rs. 70,000 per annum. You have ascertained that his variable costs are Rs. 20,000 and his fixed costs Rs. 30,000 (including 38568 Rs. 10,000 depreciation). The machinery is old and is only expected to last another four years, although it should have a residual value of Rs. 5,000.

However, the manufacturer has received an offer of Rs. 80,000 for the whole concern, subject to immediate acceptance. His average rate of return for the risk involved in the business is 10% and he expects that he could obtain a similar return if he were to sell out and use the proceeds for another investment.

State whether you would advise the manufacturer to sell or not, giving the reasons for your recommendation, including all workings. Ignore taxation.

(ICAC Final 6/68)

Questions on Pricing

25. The cost of a product is as follows:

A PART SALES OF SALES SALES SALES			Rs.
Direct materials			3/50
Direct labour			3/00
Variable production overheads			1/50
Fixed production overheads (based on 10,	,000 pro	od'n)	4/00
			12/00
Packing and carriage			2/00
Sales commission (10% of sales revenue) Admn., selling and distribution overheads		BY	2/00
(based on 10,000 sales)		•	1/00
		- abin	17/00

The selling price at present is Rs. 20/-. The sales manager estimates that at Rs. 18/- he would sell 14,000, and at Rs. 22/- he would sell only 7,000.

Make an evaluation and recommend a price to the Managing Director stating your assumptions.

- 26. "Prices should reflect costs".
 - (i) what is meant by "costs"?
 - (ii) what factors other than cost are taken into consideration in setting a price, and why?
- 27. The XYZ Company are considering whether or not to market a new product NP 456. A management meeting has been called to discuss possible selling prices which could be charged for this product.

Prepare a report, in statement form, outlining the factors which you think should be taken into account before a final decision is reached. Your report should indicate the cost data which you would prepare and any additional information you would require in order that this data could be assembled.

- N. B. Your answer should assume the following:
 - 1. The market for NP 456 is not perfectly competitive although it is more competitive abroad than at home.
 - 2. The capacity utilisation at the factory where NP 456 will be produced has been:

1960		90%	
1961	 	92%	
1962		94%	
1963		90%	
1964		88%	
1965	40	84% (to-date)	

- 3. NP 456 requires 2 units of machine time on a special machine and the time available on this is likely to be restricted because of competing demands of other products. Supplies of skilled labour have also presented problems in the past although this is not likely to arise in the case of NP 456.
- 4. The decision to produce and sell NP 456 will require an initial investment of Rs. 50,000 excluding any additional working capital requirements.
- 5. Although NP 456 is new it is similar in many respects to other products which the company markets and falls naturally into the company's product range.

(Adapted from ACCA Final 12/65)

28. The product profit report for product A discloses the following position:

	Alpha Company Ltd		
	Product A	Rs.	Rs.
Sales - 10,000 units			25,000
Less Variable Costs		15,000	
Fixed Costs		9,000	24,000
Profit	in the second place	•• = = 0 9	1,000
Profit as % of Sales		• •	4%

Note: Fixed Costs consist of Rs. 2,000 allocated general Head Office expenses and Rs. 7,000 of direct fixed costs, i.e. costs which need to be incurred only if product A is to be produced, but which do not vary according to variations in the actual quantity produced.

The company have a target net margin of 10% on sales and it had been decided to increase selling prices by $6\frac{1}{2}\%$ in order to achieve this. However, in view of public policy this course of action has been abandoned and a meeting has been called to decide what other action can be taken. To assist management you are required to examine the situation, indicate the steps to be taken to correct the situation and what effects such steps would have on the costs, receipts and profitability, and in particular, discuss the implications of your analysis for export pricing.

(Adapted from ACCA III 6/67)

29. A company receives steel in strip from a nearby steel-mill. On a specialised machine, from one kind of steel strip, there are produced three products A, B and C. Product A is taken from the machine and further processed to make it available for sale at Rs. 12/50 each. The additional processing cost for product A is Rs. 1760 per month. Products B and C are run through a dipping vat to make them heat-resistant. The dipping material costs are calculated at Rs. 0/75 per cubic foot of product. Product B will then sell at Rs. 18/- each and product C at Rs. 30/- each.

In the month of May, 1966, the costs of running the machine for the month were:

		Rs.
Materials	 ••	28,350
Direct labour	 	6,000
Maintenance and depreciation	 50 1.05	4,350
		38,700

Production and sales for the month were: Product A 600 units, product B 800 units, and product C 1,000 units, and this can be regarded as a typical product mix.

Product B has a volume of ½ cubic ft. and product C of ½ cubic ft. The dipping vat is being depreciated at the rate of Rs. 240/- per month. It requires six men for its operation at a total cost of Rs. 5,400 per month and necessitates other operating costs of Rs. 600/- per month; these costs are regarded as fixed costs.

- (a) Produce a cost statement for May 1966 assigning the joint costs to each product;
- (b) Make your recommendations on the advisability of the company selling, on a long-run basis, product B undipped, at Rs. 17/– each.

 (Adapted from ICWA IV 6/67)
- 30. The Sales Manager of Lanka Confectioners Ltd. has taken a market survey which shows the following effects of revising the selling prices of chocolate products:—

A 1/	Revision of Selling Price		Change in Volume	
Alternative	Decrease	Increase	Increase	Decrease
A	3%		10%	
В		6%	1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	15%
C	20%		20 %	-

Cost data and statistics of the company gave the following figures:-

Fixed expenses per year ... Rs. 160,000 Variable expenses per unit ... Rs. 2/40

Outlook for this year at the present selling price of Rs. 4 per lb. is a net profit of Rs. 40,000.

You are required to show whether a price change should be introduced and if so which of the Sales Manager's alternatives should be accepted by Management. Prove your answers by figures.

(ICAC Final 12/65)

31. Sales of Product X are seasonal. Out of 12,000/year, about 6000 are sold March/April. The price is Rs. 15/- and variable costs are Rs. 7/- unit.

Product Y sells 6000 a year evenly throughout the year at a price of Rs. 10/-. Variable costs are Rs. 5/-.

It is proposed to offer product Y for Rs. 5/- only, provided the customer purchases also product X at the full price at the same time. This is expected to create a more even demand for product X and reduce its variable costs to Rs. 6/- a unit. A new sales forecast shows 5000 of X alone, 3000 of Y alone, and 7000 of X with Y.

Evaluate the proposal.

32. What do you understand by the term "marginal costing"? What advantages does it have over full costing systems in determining selling prices? When might it be advantageous for a firm to sell at a price which is below marginal cost?

(ACCA Final 6/65)

33. Rappup Ltd. is engaged solely in coating other manufacturers' metal fabrications with a preservative. The fabrications are at no time the property of Rappup Ltd. and their value does not appear in that company's accounts. Rappup Ltd. have prepared the following budget for the six months ending 31st September 1969:-

Budget		Quantity	Value Rs.
Preservative Direct labour Variable overhea	 id	5,000 cans 15,000 hours	200,000 50,000 150,000
Factory cost Fixed overhead			400,000 250,000
Total cost Profit	••		650,000 130,000
Sales			780,000

Variable overhead can be assumed to vary in direct proportion to direct labour hours.

Early in February 1969 the company was asked to quote for coating for a new customer, the contract to be completed by the 31st May 1969. The technical director estimates that each fabrication unit will require 1 can of preservative and 7 direct labour hours to complete, and asks the accountant to calculate a selling price. The Board however are concerned because difficulty has always been experienced in obtaining regular supplies of preservative, and labour is in short supply in April and May because of the incidence of holidays.

You are required to :-

(a) calculate on each of the following assumptions a price for the new contract below which it would not pay to sell:-

- (i) assuming normal absorption costing principles with fixed overhead cost based on factory cost and a profit loading based on total cost;
- (ii) assuming direct material is the major factor limiting production;
- (iii) assuming direct labour is the major factor limiting production;
- (b) state which price you would recommend and why. Would you differ in your recommendation if delivery was requested in September 1969? (Give reasons).

(Adapted from ICA Final 5/69)

34. A small company manufacturing components for the motor car industry consists of a light machine shop and an assembly department. In a normal year when sales amounted to Rs. 1,206,830, its costs were as follows:

		Rs.
Direct materials		248,320
Direct wages, machine shop	 	166,940
Direct wages, assembly	 	80,900
Factory overheads, machine shop		317,420
Factory overheads, assembly	 	72,640
Administration costs	 	87,670
Selling costs	 	69,450
Distribution costs	 	64,270
Distribution Costs		, the little of

Direct labour hours amounted to 63,500 in the machine shop and 40,000 in the assembly department.

It is the company's custom to absorb overheads as follows:

Factory overhead, machine shop, at Rs. 5/- per direct labour hour. Factory overhead, assembly dept, at Rs. 1/80 per direct labour hour. Administration, selling and distribution costs at 25% on production cost.

A certain component is made from 50 lbs. of steel strip costing Rs. 1120/- per ton and requires $3\frac{1}{2}$ hours of machine shop labour charged at Rs. 2/50 per hour, and $1\frac{3}{4}$ hours of assembly labour charged at Rs. 2/- per hour. The customer is being charged a price of Rs. 60/- each, and asks for quotations for exactly the same component (a) made in "free issue" material, and (b) made from brass strip requiring 50 lbs. per article at a cost of Re. 1/- per lb. Management asks for information to enable quotations to be made as required, and also to see whether the present selling price is reasonable. Present figures as required.

(Adapted from ICWA)

SUGGESTED ANSWERS

1. Managing Director, Bandula Estates Co., Ltd., Nuwara Eliya,

Dear Sir,

In answer to your query the opportunity cost of anything is the profit reduction it causes. This may be more than the labour materials and overheads paid out in producing it, since the production of some other article may be thereby prevented. If the latter could have been sold at above cost, this profit is lost and is part of the opportunity cost of the article produced.

This concept of cost is used in deciding between alternative courses of action. Course A should be followed if the revenue or other benefits exceed the opportunity cost, since the latter includes any profit foregone by excluding Course B. This is only another way of saying that Course A is preferred to Course B where the revenue from Course A minus the paid-out costs of Course A is higher than the revenue from Course B minus the paid-out costs of Course B.

A simple example can be made from a decision whether to plant tea or cardamom on a 20 acre plot. Suppose the cost of production of tea, determined in the ordinary way, is expected to be Rs. 1/50 a lb., the yield would be 1000 lbs/acre, and the net sale average would be Rs. 2/-. This may appear profitable at first sight, but the *opportunity cost* of production of tea should also be considered. Suppose that planting cardamom would result in a cost of Rs. 3/- per lb. and a yield of 100 lbs./acre of dried cardamoms which would sell at Rs. 20/- per lb. The opportunity cost of tea would then be as follows:-

Paid out cost ... 1/50 per lb.

Add loss of profit on cardamom:

20 acres x 100 lbs./acre x (Rs. 20 – 3) per lb.

Rs. 34,000

Divided by 20,000 lbs, of tea = 1/70 per lb.

Opportunity cost of tea = Rs. 3/20 per lb.

Obviously in this case it would not pay to produce tea at Rs. 3/20 and sell it for Rs. 2/-.

The opportunity cost of anything depends on the opportunities foregone. In the above example, the cardamom profit is foregone, but it could have been some other crop or use for the land. It is not possible to work out the opportunity cost of anything in advance without knowing the most favourable opportunity foregone. This depends on the particular facts at the time of decision and cannot be provided by any costing system on a regular basis, i.e. no change in your costing system will provide opportunity costs automatically. Each decision should be judged on its merits having regard to the alternative opportunities.

I hope this answers your query. I shall be glad to explain any point further if you require.

Yours faithfully, Management Accountant

- 2. A decision whether to continue making a component or to buy in depends on the following accounting factors:-
 - (i) the variable costs actually saved by discontinuing manufacture, such as materials, direct labour, power, consumable supplies, etc;
- (ii) there may be some saving of fixed costs if the component is a high-volume item, e.g. a supervisor's salary may be saved. If the component requires special machinery or tooling, its maintenance will be saved, and the special machinery or tooling may be sold;
- (iii) the additional costs incurred by buying-in, i.e. the supplier's price, plus freight inwards. On top of this, it may be necessary to keep larger stocks on hand because of uncertainties in supply; this entails higher storage costs, including interest on capital tied up;
- (iv) if the productive capacity released can be used for additional production, the contribution from this (additional revenue, minus variable costs) should also be brought in in favour of buying in. This is very significant where productive capacity is the limiting factor on profits.
 - If (i) + (ii) (iii) + (iv) is plus, profits will be increased by buying in. However the following factors should also be considered:
- (v) if the supplier's price (which presumably includes fixed costs and profit) is less than the firm's variable cost alone, both should be closely investigated. It could be that the supplier specialises in the component and produces it cheaply in high volume. On the other hand, the supplier may be quoting a cut price to get an extra order and the price will be raised later. Or the firm's own costs of production may be too high; a cost reduction campaign may be indicated;
- (vi) the comparative quality of the components bought in and made. Value analysis should be used in the comparison;
- (vii) reliability of outside supply compared with the reliability of own production;
- (viii) effect on the labour force by losing work; can labour made idle be absorbed elsewhere? What is the effect on morale?
 - (ix) contracted supply is more flexible than inside production; adjustments in the scale of production are avoided.

3. (a)					Present
Breakdown hours 0	5	10	15	20	25
Loss of revenue Rs. 400/hour —	-2000	-4000	-6000	-8000	-10000
Saving of process					
labour during stoppages Rs. 50/					
hour upto 10 hrs. —	+250	+ 500	+500	+ 500	0 +500
Saving of raw	. 400	. 000	. 1200	. 1000	2000
materials Rs. 80/ hour — Maintenance costs -32000) + 2000) -1000
Repair costs —	-3000	-4000			0 -10000
Net cash flows per week					
under each alternative –3200	00 –2035	0 –14700	0 –14300 Best	-1590	0 –18500
3. (b) If we undertake maintenant					
lose only 15 hours, produc The extra 10 hours increases					
	revenue	, Oy	13. 4,0	30/ WCC	K.
4. Using high quality materials Labour cost of 100,000 units	of P.		I	Rs.	Rs.
250,000 hours @ Rs. 2/-					500,000
Overhead – variable			• •		400,000
- fixed Material: (5 units @ Rs. 4/2	20) x 100	000	• •		200,000
$= 21 \times 100,000$	20) A 100	,,000			2,100,000
10% Rework: Labour 25,00		@ Rs. 2		,000	
Variable over Material 21 x				,000,	
Waterial 21 X	10,000			,000	
Less scrap: 5	x 1/20 x	10,000			240,000
Total cost of 100,000 units o			-		-
(i.e. Rs. 34/40	unit co	st)	• •		3,440,000
Using low quality materials					
Labour cost: $(250,000 + \frac{100,000}{2})$) @ Rs.	2/-			600,000
Overhead - variable (assumed var	iable wi	th			400 000
labour hours) fixed		. 200,0	000		480,000
additional machine and	d tooling				212,000
Material (5 units @ Rs. 3/33) x	and the second of the second o				
@ 16/65 x 100,000		ille.	120		1,665,000
20% Rework: Labour 60,000 @ I Variable overhead		•		,000,	
Material 16/65 x 20				,000	
				,000	
Less scrap			20	,000	529,000
Total cost of 100,000 units of P	(a)				3,486,000
(i.e. Rs. 34/86 unit c	ost),	WE.● I			Section Sectio

The high quality materials reduce unit cost by 46 cents, or Rs. 46,000 over the year.

		Big	Medium	Small
5.	Contribution per drill (Rs.)	 20	12	9
	Machine time per drill (mins)	 60	30	20
	Contribution per minute (Rs.)	 0/33	0/40	0/45
	Budget Committee.			

Production Program

The remaining plant capacity should be used in making the small size only, since this is more profitable than the Medium or Big sizes – see attached table.

We should also be endeavouring to break the production bottleneck, e.g. by better production planning, overtime or shift work, more out-of-hours maintenance, contracting for work to be done by outside suppliers etc. If the excess demand is going to continue we should be considering also ordering additional plant to increase our capacity in the long term.

Management Accountant

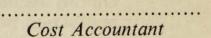
NB. From the wording of the question, it appears that machine time is a variable cost as between the products, so this is included as part of the variable cost of each product in calculating the product contributions. (This is the same as direct labour, which is usually fixed in total because of the labour laws, but variable as between the products).

		Pl	RESEN	T PLAN	PR	OPOSEI	D PLA	N		
6.		A		В		Total		Bonly		Total
Sales Less prim	e	41,000		65,000		106,000	Springer Springer	130,000	Silved.	130,000
cost variable	20,000		30,000	50	0,000		60,000		60,000	
overhead	10,000		20,000	30	0,000		40,000		40,000	
discount on sales Contri-	_	30,000	_	50,000	_	80,000	3,250	103,250	3,250	103,250
bution		11,000		15,000		26,000		26,750		26,750
less fixed										
costs						15,000				15,000
Net Profit						11,000				11,750
Managir	ng Dir	ector					A links			

Profit Plan

The attached schedule shows that eliminating Product A results in a loss of Rs. 11,000 contribution, but that doubling the output of

Product B adds Rs. 11,750 contribution (Rs. 15,000 less Rs. 3,250 discount). The net effect is a profit increase of Rs. 750/-



NB. The proposed plan is slightly better than the present plan, but is not necessarily the best plan possible. To advise on the M.D's proposal it is necessary to know the limiting factor on profit. If it is production capacity, then the firm should maximise production and sale of the product which shows the higher contribution per unit of capacity. If it is sales capacity, the policy should be to maximise production and sale of the product showing the higher contribution per hour of salesman's time (or whatever constrains extra sales.) If no factor is more limiting than any other we should maximise production and sale of B as suggested by the M.D., since this shows the higher contribution per rupee of all factors

$$(\frac{10,000}{55,000} = 0/18 \text{ per rupee, as against } \frac{1,000}{40,000} = 0/02\frac{1}{2} \text{ per rupee})$$

The above assumes that the products use equal amounts of capital for equal amounts of time. However if one product uses significantly less capital or has a significantly faster rate of turnover, its return on capital may be higher. Each product's return on capital should be calculated and in the absence of any special physical limiting factor, the one with the higher return on capital should be preferred.

			X		Y		Z	
7	Selling price	Rs.	180		150		200	
	less variable costs: material	56		48		55		
	labour – Dept. A	10		15		5		
	Dept. B	12		6		18		
	variable O/H - Dept. A*	12		18		6		
	Dept. B*	20	110	10	97	30	114	
		_		-				
	Contribution per unit	R	s. 70		53		86	
					-			

^{*}Assumed variable with direct labour hours

The relative profitability of products depends on their return per unit of limiting factor. It appears that all factors are in ample supply except labour in Depts. A & B.

(i) If labour can be transferred between the 2 departments, i.e. if it is substitutable, we have then only 1 limiting factor, viz. 200,000 hours of labour, and we can compare the products on their contribution per labour hour, as follows:

Labour hours per unit 4 4 4 4 Contribution per labour hour Rs. 17/50 13/25 21/50

On this assumption, the order of profitability is Z, X, Y and the production program should be to make as much Z as possible, i.e. up to 200,000 hours = 50,000 units, if it can all be sold,

since this will provide a contribution of 50,000 x 86 = Rs. 4,300,000 and a net profit of Rs. 1,420,000. This would require 50,000 hours in Department A and 150,000 hours in Department B i.e. 30,000 hours would be transferred from A to B.

(ii) If labour cannot be shifted nor expanded in either Department, there are 2 limiting factors and we should examine the order of profitability for each factor in turn:

Department A hours per unit

Contribution per Department A hour Rs. 35

Department B hour per unit

Contribution per Department hour

Rs. 35

3

28/67

This shows that Z would be most profitable if only A hours were limiting, and Y would be most profitable if only B hours were limiting. If both A and B hours are limiting this is a linear programming problem; the problem is to find the production mix at which contribution is maximised without using more than the hours available. This comparatively simple example may be solved by trial and error as follows:

The highest contribution/hour (any hour) is shown by Z. Production of Z is limited by the hours in B to $\frac{120,000}{3} = 40,000$

This absorbs 40,000 hours in A leaving 40,000 hours spare. Product X is the next best user of A hours but requires also B hours, so production of Z must be reduced to release some B hours.

Try 30,000 of Z. This uses 30,000 hours in A and 90,000 hours in B, leaving 50,000 hours in A and 30,000 hours in B. This allows us to make 15,000 units of X. $\left(\frac{30,000 \text{ in B}}{2}\right)$

Contribution would be $(15,000 \times 70) + (30,000 \times 86) =$ Rs. 3,630,000. However, there are still 20,000 hours spare in Department A so the position may be improved by making more of X and less of Z.

Try 20,000 of Z. This uses 20,000 hours in A and 60,000 hours in B, leaving 60,000 hours in A and 60,000 in B. This allows us to make 30,000 of X, leaving no spare hours. Contribution would be $(30,000 \times 70) + (20,000 \times 86) = \text{Rs.} 3,820,000$, which is higher than before.

Further trial and error shows that this result is optimum as it cannot be improved by making more or less of any of the 3 products.

The recommendation therefore is as follows:

V 20 000 units giving a contrib

X 30,000 units giving a Y NIL	contrib	ution of	Rs.	2,100,0	00
Z 20,000 units giving a	contrib	oution of		1,720,0	00
	less fix	ed costs		3,820,0 2,880,0	
	Net pr	ofit	Rs	s. <u>940,0</u>	00
8. (A) Close Down Sales	Yea Rs.	r 1 Nil	Year	290,000	Total 90,000
less costs: Direct labour Direct material Production overhead Closing down costs	7,500		30,000 22,500 13,500		
Maintenance Re-opening costs Admin. overhead Selling & distb,	1,000	4-30b.et	4,000 6,500	2005	
overhead		19,500	7,250	83,750	103,250
Profit/(loss)		(19,500)		6,250	(13,250)
(B) Continue Sales Rs. less costs:	34	49,500		90,000	139,500
Direct labour Direct material Production	20,000 15,000		30,000 22,500	a lotter	
overhead Admin. overhead Selling and	12,000 6,000		13,500 6,500		
distbn. overheaad	6,500	59,500	7,250	79,750	139,250
Profit/(loss)		(10,000)		10,250	250

If the factory continues, the loss in year 1 is reduced from Rs. 19,500 to Rs. 10,000. The profit in year 2 is increased by Rs. 4,000 (costs of re-opening saved). By closing down the firm would be Rs. 13,500 worse off.

Note to students:

A more elegant solution would be to compare incremental sales and costs only, but the above presentation is preferred as it is clearer to non-financial directors.

9. (a) Statement of additional profit expected from gift token scheme

	N brand	S	brand
Selling price per bottle	Rs. 5.00		5.50
Less Variable costs – production – selling	2.00 .50 2.50	2.50 .55	3.05
Contribution per bottle	2.50		2.45
Expected sales increase	200,0	000	100,000
Total contribution	Rs	1,480,00	0
Less costs of scheme:			
Advertising, distribution, etc. Books for tokens Tokens (6.6 million x 10,000 pe million) Gifts 6,600,000 x 70% x Rs. 20	66,000		
Prizes (50,000 + 20,000 + 10,000 + 5 + 10 x 200 + 50 x 100)	5000 92,000	940,00	0
Additional profit		540,00	00
(b) Contribution per bottle as abo	ove	2.50	2.45
Present sales Present contribution less fixed costs	Rs.	2,000,000 5,000,000 3,000,000	4,000,000 9,800,000 8,000,000
Present net profit		2,000,000	1,800,000
Increased net profit (+10%) add fixed costs		2,200,000 3,000,000	1,980,000 8,000,000
Contribution required divide by increased sales (+10	0%)	5,200,000 2,200,000	9,980,000 4,400,000
Contribution per bottle requiadd variable cost per bottle	ired	2.36 2.50	2.27 3.05
Selling price required	Rs	4.86	5.32
Reduction in selling price	R	s. 0.14	0.18

EVALUATION WORKSHEET (Rs. 000)

Machine Scrap value Lumpsum dep.	0 -400	1	2	3	4	5	6	7 + 10	8	check Total -400 +10
allowance 80% x 50% W. capital Pre-tax cashflows		+160 -100	. 100	. 140	. 120	. 110	. 120	. 100	+100	+160
Tax on above @ 50%		+100	-50				+ 120 -55		-50	+800
Net cashflows Interest @ 15%	-400 -	+160 -60		+ 90 -44	+60 -37				+ 50 -24	+170 -303
Cumulative cash flows	-400	-300	-295	-249	-226	-215	-182	-159	-133	-133

The project does not reach the target return of 15% p.a. after tax and should be rejected (unless the risk is much lower than on the average project.)

11. See over page

12. To: Managing Director

Date:

From: Management Accountant

Capital Investment Appraisal

The more traditional methods which are applied to evaluate investment projects are:

(i) The Pay Back Method: – This method establishes the period of time in which the savings resulting from a project recoup the capital cost. The technique is simple to understand and operate, but oversimplifies the complex factors involved in investment problems. Because the technique places emphasis on the recoupment of the investment, it is a method of assessing liquidity, rather than profitability. The use of pay back may result in the company's investing in projects which recover capital quickly, at the expense of other projects which are more profitable in the longer term.

There are however three limited applications of this method;

- (a) to minimise the risk to capital where a project is likely to be outdated by technological change long before its productive life is over;
- (b) to ensure that liquidity is maintained if the company is short of liquid assets and;
- (c) for use as a screening process where there are a large number of alternative investments.

The use of pay back to maintain liquidity can only be countenanced in the short term; its continued use will result in a lowering of the profitability of the company. Caution must also be exercised in the use of pay back as a screening process. A further disadvantage of this method

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Evaluation
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11 Total -20 -190	+700	+480	+473	-285 -15	+950	+ 595	+495	+115
Ξ	+ 50	+50	+473		+65	+ 65 + 32	+495	+ 15 + 115 + 115 + 1
9 10 + 30 + 10	+ 70	+110	+392	+60 +15			+ 398	+ 60
6	+ 70	+70 +14	+261	AL AMA	+ 95	+95 +170 +9 +17	+211	+25
∞	07+ 07+ 07+ 07+ 07+ 07+ 07+ 07+	+70 +70 +70 +110 +50 +2 + 8 +14 +21 +31	+99 +177 +261 +392 +473		+95 +95 +95 +95 +95	+95 +1	+11 +107 +211 +398 +495	+25 +25 +25 +25 +60 -10 -8 -7 -5 -4
6 7	+ 70	+70			+ 95	+95	+111	+ 25
9	+ 70		+27		+95	+95 +95 +95 -13 -6 +1	-78	+25
8	+ 70	+70 +70 +70 +70 -17 -13 -8 -3	4	3/15	+ 95	+95	-160	
4	+70	+70	-102		+ 95	+95 +95 -25 -19	-306 -236 -160	+25 +25 +25 -13 -12 -11
8	470	+70	-159		+95 +95	+95	-306	+25
7	+ 70	+70	-212		+95	+80	-371	+10
	-50 +70 +70	+20	-261		-65 +95	+30	418	+10
-50 -200	21-	-260	-260	-100 -300 -15		415	415	-155 + 10 -12
in April	::_	::	:	::::	:::	::	1	::
11. Proposal I Buildings Plant	Working Capital Profit before dep'n	Net cash flows Interest @ 8%	Cumulative	Proposal II Buildings Plant Installation	Working Capital Profit before dep'n Sales promotion	Net cash flows Interest @ 8%	Cumulative	II Minus I Net Cash flows Interest @ 8%

II is better than I provided no extra risk is If extra risk is involved it is better to adopt I as difference in terminal value is very small. Either I or II will increase the firm's wealth (both yield over 8%).

-120

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is that the time factor is ignored; money received now is of greater value than that to be received in the future, but pay back does not take this into consideration.

(ii) Return on Original Investment Methods:— There are a number of methods of calculating the return on the original investment. One of the methods most frequently used relates the average annual savings or profits of the project to the capital cost; these are expressed as a percentage of the capital outlay or as an annual rate of return per rupee of capital invested.

These methods of investment appraisal are preferred to pay back, as they do attempt to assess profitability. Consideration is given to the costs and revenues relating to the investment over its anticipated life, but a serious limitation in common with pay back is that no weight is given to the timing of returns. It is conceivable that two projects could have the same capital cost and total income, thus being ranked equally. If, however, the income from one project were received earlier than the other, then clearly the former would be more worthwhile.

A further disadvantage of these methods is that no consideration is given to the gestation period i.e. the time which elapses between investing in a project and the receipt of the first income.

The majority of projects will have irregular cash flows, particularly when the incidence of taxation is considered. The use of these methods as a means of investment appraisal could result in the rejection of worth-while projects and the sanction of other not so profitable schemes. These methods tend to discriminate against short term projects, and projects with high tax allowances.

Discounted Cash Flow:

The importance of this technique lies in its recognition of the timing of future returns. Re. 1/- received now is of greater value than Re. 1/- to be received next year, as it can be invested and interest earned.

Full consideration is given to the anticipated life of the investment and the period in which the income from it will accrue. As future incomes are discounted to a common unit, i.e. present value, the comparison of alternative projects is facilitated. In addition, the yield method which relates the cash flow to the outstanding capital investment provides a relative measure of profitability.

The technique has been criticised on the grounds that it introduces complicated calculations into an already complicated problem. Problems may be experienced in estimating the cash flow, particularly when the investment has a long anticipated life. Furthermore, the choice of the appropriate discount rate may not be easy, especially when economic conditions are changing. If too high a rate is set, profitable projects are likely to be rejected, whereas if the rate is too low, investments are likely to be made at the expense of other more profitable projects.

Although these difficulties must be considered in the use of discounted cash flow, the technique provides a more scientific and reasonable method of investment appraisal than the traditional approach and is a powerful tool of analysis.

Management Accountant

- 13. Every future cash flow is uncertain, and the resulting yield is correspondingly uncertain:
 - (i) Revenue estimates depend upon the market. Revenue from a new and untried product is less certain than revenue from an existing product. Revenue from a product for which demand fluctuates, e.g. fashionable goods and services, is less certain than revenue from a product with stable demand. Revenue is less uncertain if the market has been professionally researched. Revenue is less uncertain if there is no competition, or if import competition is banned, or discouraged by a tariff barrier.

A cost-saving project is generally less risky, in that it does not depend upon revenue from the market.

- (ii) Cost estimates depend upon suppliers, and the efficiency of production. Capital costs are uncertain unless fixed quotations have been obtained. Costs of research and development, and of assets which have not been purchased or constructed before are less certain than assets which have been purchased or constructed before. Costs of materials are more certain if firm prices have been quoted, and wages are more certain if satisfactory agreements have been made with unions. Continuity of supply is more certain for local materials than imported materials. Continuity of labour is more certain if labour relations are good. Continuity of management, who should be committed to the project and held responsible for its success, is also important.
- (iii) Tax is a consequence of revenues and costs, apart from some uncertainty about future rates. Lump sum depreciation allowance is usually fairly certain since it is a fixed percentage of capital cost, and receivable in the near future.
- (iv) The *life* of the project depends upon the engineering life of the production assets, the rapidity of technological advance (i.e. the rate of obsolescence of these assets), and how long the product will be acceptable to customers, whichever is shortest. As before, new products and new assets on which no experience has been gained, are less certain than known products and assets.
- (v) If the project assets have alternative uses, the project as a whole is less risky.

The composition of the investment will strongly affect the assessment of risk, since some assets have values on the termination of the project, premature or otherwise, and some have no value except insofar as they generate the required sales (or cost savings).

Assets for which there is a second hand market, such as land and buildings, quoted securities, motor vehicles and ships, can be sold in the event of project failure. The capital at risk in these cases consists of the original cost less the expected realisable value at any time. Since land usually maintains its value (at the very least) this is the least risky asset; its cost may be recovered in full on the termination of the project at any time.

Investment in working capital is usually recoverable on the termination of the project at any time, and is therefore also at low risk. However, if a project is terminated prematurely because the product cannot be sold, the cost of stock in hand will not necessarily be recovered. Debtors, of course, should always be recovered, subject to bad debts.

Assets which may be converted to profitable alternative uses are less risky than specialised single-purpose assets. In a large firm, plant and equipment which cannot be used as planned, and, for which there is no secondhand market, may often be used for some other purpose, perhaps after modification.

In the same category as specialised plant and equipment are investment expenditures of the R & D kind such as market research, product development, personnel training, computer programming, and so on, since if they fail in their intention, there is no other way of getting benefit. This does not of itself make them risky; each expenditure must still be judged on its merits.

Broadly, there are two ways of bringing uncertainty into a DCF evaluation:

- (i) Best estimates are obtained for all costs, revenues, life, etc. and risk is then assessed globally after considering the above factors. This is then compared with the yield. High risk demands a high yield. Average requires only the average yield, i.e. the firm's cost of capital. A low risk project may be allowed even on a yield lower than the cost of capital.
- (ii) The second method of treating risk is to get three estimates for each doubtful figure representing the worst, most likely, and best expected, and make three calculations to show the range expected. If a project meets the cost of capital, even after all the 'worst' revenue and 'worst' cost figures, evidently it should be accepted. If the worst is below the cost of capital,

but "mostly likely" and "best" are above, this may also be accepted, but it will depend on how bad the "worst" case is.

This approach may also be applied to each variable in turn to assess its effect on the yield (sensitivity analysis).

This takes longer than method (i), but is better in that it provides an approximate probability distribution of yield.

- 14. Before any evaluation, all the consequences of purchasing, or of sending trainees to India, must be clearly defined. In particular:
 - (i) is there a need for training after 1971? Will 8 engineers be enough, allowing for wastage?
 - (ii) if we purchase, what do we do with the machine after training the engineers, e.g. sell it or hire it to a customer, or return it to the parent company for a trade-in-allowance. How much do we get and when?
 - (iii) if it is sold to a customer, does this reduce the remaining sales, i.e. is the market limited?

If we assume:

- (i) no training after 1971
- (ii) sale of excavator at second hand price of Rs. 100,000
- (iii) no reduction of market thereby, then we have the following incremental cash flows (in thousands of rupees):

Train in India:	1969	1970	1971
Training and travel charge @ Rs. 5,000/man.		25	-15
Train in Ceylon: Excavator, purchase and sale Operating costs Instructor (½/month) & classroom (½/r	–130 nonth) –	-4	+100 -4 -1
ar year dealer of the latest the	-130) -5 -5	+ 95
Net cash flows (Ceylon – India) + interest @ 5%	130	+ 20 -6	+110
Cumulative	130	0 –116	-12

On the above assumptions, it is financially better to train in India. There may be other non-financial differences, e.g. (i) training in Ceylon on their "own" machine may be better for the engineers, (ii) the engineers may prefer the trip to India, etc.

N.B. The question is not asked, but it may be worth considering whether to train all 8 engineers in 1970, so that the machine can be sold earlier. The incremental cost would be 1 year's salaries paid to 3 engineers who are not required till 1971. Against this, one year's interest on the sale price of the machine would be saved.

15. Assume:

- (i) not more than 1 shift per day (176 hours' use per month)
- (ii) no sale of spare capacity
- (iii) no scrap value after 5 years
- (iv) equal benefits from rented computer as from purchased computer (this is generally true if the assumptions above are correct)

 Then we may compare costs and tax consequences alone:

BUY Purchase price Cash value of 50%	End. y	/r. 0 -30,000	1	2	3	4	5	6
depreciation all.			+7500					
Maintenance Tax relief on main	nt.		-1200	-1200 + 600		-1200 + 600	-1200 + 600	+600
THE RESIDENCE								
		-30,000	+6300	-600	-600	-600	-600	+600
RENT Rentals			_12000	-12000	_12000	_12000	_12000	
Tax relief on renta	als	911	12000				+6000	+6000
			-12000	-6000	-6000	-6000	-6000	+6000
BUY MINUS REN	NT .	-30,000	+18300	+ 5400	+5400	+5400	+5400	-5400

If the cost of capital is 5%, including any incremental risk of buying as against renting (i.e. the risk of premature scrapping) we may discount or compound the incremental cash flows at 5% to see whether the rentals saved are sufficient to justify the purchase:

TV is positive, therefore on the assumptions stated, it is better to buy.

If we expect inflation @ 5% p.a. for the next 5 years, the cash flows above will not be affected, insofar as they are contracted in money terms at the outset, but the rentals saved will be less in real terms. By discounting or compounding at 10% (5% cost + 5% inflation) we can test whether the rentals saved are still sufficient to justify purchase:

16. Rate of return on initial capital (before tax)

This is assumed to be the average annual return over the life of the asset, and initial capital is assumed to include not only initial expenditure on capital assets and "capital type" expenses (such as market research and training costs), but also initial working capital, since this is a commonly used definition.

Advantages

- 1. Fairly simple to calculate, particularly when profits are the same each year (no averaging necessary).
- 2. Widely used and understood.

Disadvantages

The disadvantage of rate of return is that, for the sake of simplicity, it ignores a number of factors (quantifiable factors) affecting profitability, e.g. the period of time over which a certain rate of return will be achieved. (These factors may of course be separately reported but it is better to combine them in a single measure of profitability (i) so that they are not forgotten, and (ii) to save decision-makers guessing how much weight to give to each factor).

Unless the following factors are the same in all projects considered, and the same in any standard or cut-off rate against which they are compared, comparisons will be distorted, and wrong decisions are risked:

- 1. Life of project. On an asset costing 100, a profit of 20 a year for 5 years appears as profitable as 20 a year for 10 years, or forever.
- 2. Pattern of returns within the project life. Early returns are worth more than later returns since they can save interest costs or be reinvested to earn additional profits. Rate of return gives equal weight to all returns and thus fails to discriminate (or discriminate sufficiently) against projects with long pre-production periods, or slow build-up to full capacity.
- 3. Tax. The shareholder prefers 80, less 20 tax, to 100, less 50 tax. Rate of return fails to discriminate against projects with relatively low tax allowances and reliefs on expenditure (e.g. due to assets or expenses not being eligible), or in favour of projects with relatively high tax allowances (e.g. development grant).
- 4. Increases in working capital later in the life of the project are often ignored.

Pay-back

This is taken to be payback of initial outlay as above, including payback in the form of tax allowances and reliefs (as commonly applied).

Advantages

- 1. Simple to calculate, provided tax consequences are known, and a useful screen to prevent further time being spent on obviously unprofitable projects.
- 2. Fairly widely used and understood.
- 3. Gives weight to liquidity as well as to profitability.

4. When risks of not getting the expected benefits depend mainly on how far they are away (i.e. time risks such as obsolescence, inflation, difficulty of forecasting revenue in the distant future, etc.) the payback method gives weight to this by preferring projects with near returns, i.e. less risk.

Disadvantages

- 1. No account is taken of the life of the project. On an outlay of 100, 20 a year for 5 years (i.e. nil profit) is preferred to 15 a year for 10 years. No account is taken of any cash flows after the period of payback (which may even be negative, e.g. tax payments). Profitability is sacrificed to liquidity.
- 2. Within the period of payback no preference is given to early returns as against late returns.

Discounted cash flow-present value

Advantages

- 1. All factors quantifiable in cash terms are taken into account.
- 2. The habit of thinking in terms of cash flows is a powerful tool of analysis, since the same principles apply to the financial evaluation of all plans, policies, proposals and projects (both capital and revenue expenditure).
- 3. If risk can be assessed as a percentage addition to the cost of capital, then projects may be accepted on positive present value, or rejected on negative present value, without further consideration.

Disadvantages

- 1. Net present value is an absolute quantity, unrelated to the initial capital or the average capital outstanding. Therefore projects cannot be ranked on NPV unless the risks are equal in each project; when capital is limited, projects can only be ranked on PV/capital ratios, assuming that all are of equal risk.
- 2. Even with tables, it requires more clerical calculation than the older methods and may blind the inexperienced user to some common sense considerations.

Discounted cash flow - yield

Advantages

- 1. All factors quantifiable in cash terms are taken into account.
- 2. A powerful analytical tool.
- 3. If the cost of capital is uncertain, the calculation can still be made.
- 4. Yield, as a percentage rate, is widely understood, and is comparable with all other true yields, e.g. the redemption yield on a debenture.
- 5. Projects can be ranked on yield (taking the increment in the case of mutually exclusive projects).

Disadvantages

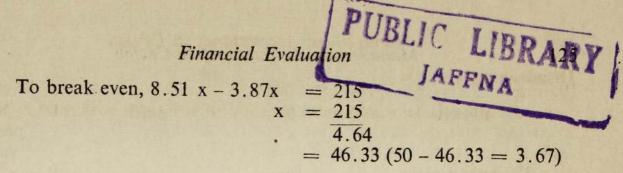
1. Requires a trial and error method of solution, which takes longer.

17.	(i) Year	Rs. 00	0 1	2	3	4	5	6	7- 2 20	21
		240 10 80 160								
	$(66\frac{2}{3}\% \times 50\% \times 240)$ Dev. rebate		+ 80							
	(40 %x50 % x 240) Loan interest		+ 48							
	(subsidised) 4½% p.a. on									
	reducing balance Tax allowed on		-7	-6	-4	-3	-1			
	intt. 50% on 9% p.a. on reducing									
	balance Loan principal			+7	+ 6	+4	+3	+1		
	repayments Cost reduction		-32	-32	-32	-32	-32			
	& revenue increase (5 cents/lb.)		+ 50	+ 50	+ 50	+50	+ 50	+50	+50	
	Tax on extra profit			-25	-25	-25	-25	-25	-25 -	25
	Net equity cash flows Factor @ 10% Present values	-10 ·	+ 139 .91 + 126	-6 .83 -5	-5 .75 -4	-6 .68 -4	-5 - .62 -3 -	+ 24 + .56 + 13 +	- 25 - 4.16 . - 105	25 14 -3

Net present value (Rs. 000) = + 215 therefore the firm should purchase.

(ii) Let maximum fall off in above profit increase/year (in Rs. 000)=x Then PV of an annuity of x from years 1-20=8.51 x

$$Tax = \frac{x}{2}$$
 from years 2-21 PV = $\frac{7.74 \text{ x}}{2}$
= 3.87 x



Answer: the firm need make only Rs. 3670 extra profit/year from the machinery (cost savings and sale price increases together) to justify the purchase, i.e. a third of a cent per lb.

18. The annual cash flow from the respective machines is as follows:

Revenue @ 0/50 per article	Rs.	Rs. 20,000	Rs.	Rs. 15,000
less variable costs— wages — other	2,800 4,800	7,600	4,800 5,800	10,600
		12,400		4,400

(a) If the replacement is made now we have the following cash flows Year 0 Years 1-10 Year 10 Years 11-20 Year 20 etc.

$$-40,000 + 12,400 -40,000 + 12,400 -40,000$$

The present value of the first replacement is:

$$(-40,000) + (12,400 \times 6.14457) = Rs. 36,200$$

The present value of the series of replacements in perpetuity is given by multiplying the PV of the first replacement by

$$\frac{(1+r)^k}{(1+r)^{k-1}}$$

where k is the number of years between each replacement.

$$\frac{36,200 \times (1.10)^{10}}{(1.10)^{10} - 1} = 58,900$$

(b) If the replacement is made after 6 years, we have the following cash flows:

The present value of this series is given by
$$(+4,400 \times 4.35526) + (58,900 \times .564474) = 52,400$$

Therefore replacement now is better than after 6 years.

(This same sort of calculation should be made for replacement after intermediate periods e.g. the PV of replacing after 3 years is given by $(4400 \times 2.48685) + (58,900 \times .751315) = 55,190$. This confirms that in this case the highest PV is from immediate replacement).

19.	YEAR 3" Expenditure	Rs. 00 0	0 1	2–10	11	Net present value
	Lump sum dep. allowance Savings Tax		+5.3 +20	+ 20 -10	-10	
		-16	+ 25.3	+10	-10	
	15% factor Present values	1.0 -16	0.87. + 22.0	4.15 +41.5	0:.21 -2.1	+45.4
	4" Exp. & LSDA Savings Tax	-24	+ 8 + 25	+ 25 -12.5	-12.5	
		-24	+ 33	+12.5	-12.5	
	PV	-24	+ 28.7	+51.9	-2.5	+ 54.1
	5° Exp. & LSDA Savings Tax	-36	+ 12 + 30	+ 30 -15	-15	
		-36	+42	+ 15	-15	
	PV	-36	+ 36.5	+62.2	-3.1	+ 59.6
	6" Exp. & LSDA Savings Tax	-64	+21.3 +35	+35 -17.5	-17.5	
	de se protest est	-64	+ 56.3	+17.5	-17.5	
	PV AND	-64	+49.0	+72.6	-3.7	+ 53.9
	7" Exp. & LSDA Savings Tax	-150	+ 50 + 32	+ 32 -16	-16	
	and the section of the	-150	+ 82	+16	-16	
Thomas (2)	PV	-150	+71.3	+ 66.4	-3.4	-15.7

If there is no risk difference between the above alternatives, we recommend the 5'' pipe since this shows the highest present value after discounting at the 15% cut-off rate.

Note to students: The evaluation of mutually exclusive alternatives is the evaluation of the increments or differences between them. However if every alternative is discounted at the same 15% rate, it is not necessary to calculate the differences as they are reflected in the above net present values.

For instance, if we looked at the difference between a 4" pipe and a 3" pipe, we have Rs. (000) 1 year 0 1 2-10 11

-8 +7.7 +2.5 -2.5

Discounted at 15% this gives a net present value of +8.7 (i.e. the same as 54.1-45.4). Since 54.1 is more than 45.4 the NPV of the increment is positive, proving that 4^n is better than 3^n .

Similarly 5" is better than 4" (NPV of increment is +5.5) but 6" is worse than 5" (NPV of increment is -5.7).

If the savings from the larger pipelines are less certain (higher risk) then it would be necessary to schedule the cash flows from each increment and calculate the yield which reduces the NPV of the increment to nil. This yield would then be compared, not only with the 15% required, but also any additional return required to cover the extra risk.

- 20. (a) The proposal does not give enough evidence of cash savings sufficient to outweigh the expenditure, and cannot be supported without further information, as follows:
 - (i) how many crankshafts will be ground in future years? (may be more or less than the present 5,000).
 - (ii) how many years will the machine last? (it may have to be scrapped within 5 years).
 - (iii) has the 20 minute saving been agreed by the Work Study Department? (manufacturer's claims are often based on ideal conditions).
 - (iv) what will happen to the 20 minutes saved? (time savings can only be counted as *cash* savings if labour is laid off, which is unlikely, or if labour is actually to be transferred to other worthwhile jobs; if the time will be spent on grinding more crankshafts, for which there is a market, there will be additional contribution from these instead of time savings).
 - (v) direct labour rate of Rs. 10/hour sounds very high.
 - (vi) what works overheads would actually be saved? (most overheads are fixed costs which would not be saved by completing work in shorter time).
 - (vii) does the capital expenditure of Rs. 250,000 include FEEC, duty, landing charges, inland transport, installation, and dismantling of old machine (net of any scrap value)?
 - (viii) what is the cost of capital?

- (ix) does the higher quality finish have any cash value?
- (b) Alternatives to immediate purchase are as follows:
 - (i) continue with existing machine until repair costs make the new machine economic.
 - (ii) industrial equipment leasing.
 - (iii) hire purchase.
 - (iv) contract out for the operation.

Rs. 000 21. 5 Net 3 4 6 1 Year present Continue value Production of A +120 + 80 + 25Revenue from A Variable costs* -89Fixed costs -30-30-30specific to A +42 +42 +42 +18 +18 +18 Sales of spares +43 +92 +37 +18 +18 Net cash flows .74 PV factors @ 8% .93 .86 .79 . 68 .63 +40 +79 +29 +13 +12 +12 +185 Present values License out Production of A Sale of manf. +20rights Sale of stocks +80of A Royalty on +8 +6 +3 sales† Sale of spares stocks (omit) +6 Net cash flows + 100 +8 +3(excl. sale of spares) .79 PV factors 1.0 .93 .86 +114 Present values +100+7 +5 +2

*It is assumed that the variable cost of sales in year 3 (Rs. 19,000) and in year 2 (Rs. 60,000) are met entirely from the existing stocks and work-in-progress. This leaves Rs. 1,000 which is the stock run-down in year 1.

†It is assumed that the competitor will achieve the same sales over the next 3 years as this firm would achieve.

The difference in net present values is Rs. 71,000. Therefore the competitor's offer may be accepted if he pays at least Rs. 71,000 for the spares stock.

22. Evaluation of Elektraps manufacture

(Rs.000)

1966	1967	1968		Net oresent value
-250				
-85				
	+ 400	+ 500	+400	
	-300	-375	-300	
-55			+ 5	
-390	+100	+125	+ 105	
1.0	.909	.826	.751	
-390	+91	+ 103	+79	-117
	-250 -85 -55 -390 1.0	-250 -85 + 400 -300 -55 -390 + 100 1.0 .909	-250 -85 + 400 + 500 -300 -375 -55 -390 + 100 + 125 1.0 .909 .826	-250 -85 + 400 + 500 + 400 -300 -375 -300 +5 -390 + 100 + 125 + 105 1.0 .909 .826 .751

Manufacture of Elektraps is not worthwhile, subject to the following considerations:

- (i) if the value of general research is less than Rs. 12/50 per manhour, the opportunity cost of Research Department time on the above project would be less than Rs. 250,000. The above evaluation assumes that the value of general research to the company is at least what the company pays for it.
- (ii) the life of the product may be more than 3 years. If sales continued at 2000 units/year, the project would break even towards the end of 1971.
- (iii) if the direct labour would be unemployed except for the manufacture of Elektraps, its opportunity cost is nil, which would make the project worthwhile.

Note to students

- 1. The decision to spend 5% of turnover on research department salaries is entirely independent of the decision on Elektraps. Any extra salaries are the result of an administrative decision and are not a necessary consequence of the above project. Therefore they are excluded.
- 2. Past expenditure on the preliminary feasibility study is also excluded as it is sunk.
- 3. Use of the XL 120 of this project will lose the immediate sale proceeds of Rs. 55,000, so this is the opportunity cost of this asset.
- 4. Use of the WL 200 will not cause any loss elsewhere in the company, as it would not otherwise be sold (it is assumed that the 70% utilisation justifies retaining it) and there is no other use for the spare 30% so this is free to the project.

	Cash Flow	Schedule	(Rs)	
	Year	Years	Years	Total
	0	1–6	7–56	
House	2000			
Plants	395	45		
Lining etc.	360			
Fencing	500			
Weeding, watering etc.	500	80	298	
Pest prevention		42		
Manuring		133	103	
Other costs		33	76	
	. (a) 			
Total cash payments	3755	333	477	
Cash receipts	- 0/4 1 - 1	-	1600	
			1100	
Net cash flows	-3755	-333	+1123	
T DV C -+ 0 100/	1.0	1 255	5.595	
Try PV factors @ 10%	1.0	4.355		. 1077
Present values	-3755	-1451	+6283	+ 1077
Try DV footors @ 15%	1.0	3.784	2.879	
Try PV factors @ 15% Present values	-3755		+ 3233	-1783
Present values	-3133	-1201	T 3233	-1703

Interpolating between 10% and 15%, the yield is $10\% + \left(\frac{1077}{2860} \times 5\%\right)$ = 12%

N.B. These costs appear to omit the cost of land and the cost of management. On the other hand, the revenue omits possible revenue from the sale of bristle fibre, mattress fibre, etc.

The above yield of 12% is highly sensitive to changes in yield per acre from risks such as coconut beetle, (e.g. 500 nuts/acre would be uneconomic at any cost of capital), and to the market price of coconuts.

24. Cash flows from continuing the business

Revenue Variable cash costs Fixed cash costs Machinery proceeds	Year 1 + 70,000 -20,000 -20,000	2 + 70,000 -20,000 -20,000	3 + 70,000 -20,000 -20,000	4 + 70,000 -20,000 -20,000 + 5,000,
Net cash flows Interest @ 10%	+ 30,000	+ 30,000 + 3,000	+ 30,000 + 6,300	+ 35,000 + 9,930
Cumulative cash flow	+ 30,000	+ 63,000	+99,300	+ 144,230

Cash flows from immediate Sale

	Year 0	1	2	3	4
Sale price Interest	+ 80,000				
@ 10%		+8,000	+ 8,800	+9,680	+ 10,648
Cumulative	+80,000	+ 88,000	+ 96,800	+ 106,480	+ 117,128

If the manufacturer continues in business he will increase his wealth by Rs. 144,230 after 4 years (subject to risk).

If he sells out he increases his wealth by Rs. 117,128 after 4 years (subject to risk). Therefore he should not sell.

(Note to students: Since the question does not give present value factors, the terminal value method is used)

Suggested answers to questions on pricing

25.	We recommend a price of Rs as follows:	s. 18/–.	This sho	ows the high	est profit,
	Alternative prices		18/-	20/-	22/-
	Sales forecast		14,000	10,000	7,000
	Revenue Variable costs –		252,000	200,000	154,000
	production (Rs. 8/– unit)	disting t	112,000	80,000	56,000
	packing etc. (Rs. 2/- unit)		28,000	20,000	14,000
	Comm'n (10% of Rev.)		25,200	20,000	15,400
	Contribution		86,800	80,000	68,600
	Fixed costs		50,000	50,000	50,000
	Profit		36,800	30,000	18,600
		-			

Assumptions:

- (i) that we will in fact sell 14,000 units at this price (N.B. this is a 40% increase in volume for a 10% drop in price);
- (ii) that we can produce this volume next year, i.e. that we can get adequate raw materials, labour, production capacity, etc;
- (iii) that unit costs will be as given above (in particular that fixed costs will not increase despite the big increase in production).
- (iv) no impact on any other product or on employment.
- (v) that a similar picture would be shown on a longer term comparison, e.g. over 3 to 5 years.
- 26. (i) "Cost" has different meanings. Costs that are often used in setting prices are as follows:

- (a) full cost, i.e. prime cost plus variable overheads plus fixed overheads per unit (based on expected volume, which in turn depends upon the price);
- (b) conversion cost, i.e. labour plus overheads only;
- (c) marginal or variable cost only.

Each of these may be either expected future cost, or past cost, and may be actual cost or standard cost. To an economist, cost is opportunity cost i.e. the value lost elsewhere by this use of resources. This normally includes the interest cost of capital.

- (ii) Factors other than cost that are taken into consideration in setting a price include the following:
 - (a) the profit required, e.g. maximum profit, fair profit, satisfactory profit;
 - (b) the market, i.e. the prices, respective qualities and advantages, and advertising of competing products compared with own product;
 - (c) other external constraints on the price, e.g. imposed by the Government, by public policy, by trade association, or by powerful buyers (monopsony);
 - (d) the amount of spare capacity (it may be advisable to reduce the price so as to produce and sell more, if this results in higher profit);
 - (e) labour relations may suffer from low production resulting from high price and vice versa;
 - (f) special prices may be charged to maintain and improve customer goodwill, or to encourage sales in other lines (loss leaders) or as part of market strategy;
 - (g) a tender for a large contract may be reduced if it is thought this would provide valuable experience or introduce new skills or techniques into the firm;
 - (h) if a product or contract will use scarce resources (limiting factors which are worth more to the firm than the amounts paid for them), higher prices may be charged accordingly, so as to improve the return per unit of limiting factor.

27. To all participants,

Date:

Factors affecting pricing of N P 456

Financial factors

1. What is profitability of NP 456?

Will it add more contribution and profit than any other use of our resources?

- 2. How firm are the market forecasts and cost estimates? What sales volume and unit cost do we need to break even?
- 3. Can we finance the equipment and working capital required without running into cash liquidity problems?

To get answers to the above questions I need various data as follows:

A. Sales Manager

- (i) sales forecasts for the next 5 years at the following prices:
 - suggested price (home and export sales separately)
 - ditto plus 10%
 - ditto minus 10%

For each price I would like to get a spread of 3 forecasts, based respectively on the worst (most pessimistic) assumptions, most likely assumptions, and best (most optimistic) assumptions.

- (ii) what impact will sales at each price have on our existing product range?
- (iii) will customers require special packing, delivery, discount or credit terms, etc. and will the product require any market research or sales promotional costs above the existing appropriation?

B. Production Manager

- (iv) what will be the variable cost per unit of NP 456, and how will this increase over the next 5 years? (please provide most optimistic, most likely, & most pessimistic estimates)
 - (v) what additional fixed costs will there be, e.g. will a separate product supervisor be required for NP 456?
- (vi) will the production of NP 456 compete for limited machine time or any other resources? If so and if NP 456 were given priority how much would we have to cut back other products?
- (vii) what resources would NP 456 use that we already have in excess? (e.g. what is our spare capacity, projected forward over the next 5 years)?

Marketing factors

- 4. Will NP 456 strengthen our position in the market? Will it add to our total market share?
- 5. What will be competitive reaction?
- 6. Should NP 456 be marketed in the same way as other products in the range? Will the export sales cause additional costs?

Production factors

- 7. Is supply of raw materials and other inputs assured?
- 8. Skilled labour position?
- 9. Any special problems of production planning and control?

Legal factors

- 10. Patent position on NP 456?
- 11. Product liability insurance necessary?

Personnel factors

- 12. Effect on labour force if we fail to produce and sell NP 456; can we find alternative employment?
- 13. Is NP 456 likely to give rise to any personnel problems, union demands etc?

Public relations factors

- 14. What is Government attitude to NP 456 (e.g. how much is it a necessity in the present economic situation? To what income groups will it be sold?)
- 15. What would be considered a reasonable price?
- 16. Would export sales cover the foreign exchange requirements?

Management Accountant

28.

Product A Profitability

	Unit	Annual total	marg	ginon sales
	Rs.	Rs.	ME	%
Sales	2/50	25,000		100
less variable costs:	1/50	15,000		60
Contribution	1/-	10,000		40
less fixed costs -				
specific to product A		7,000	28	
share of H.O. costs		2,000 9,000	8	36
			-	
		1,000		4

The net profit margin may be increased to 10% in any of the following ways (other than by increasing the selling price):-

(i) increase sales volume to 12,000 units at present price (or correspondingly higher sales at a lower price).

This will provide Rs. 12,000 contribution and Rs. 3,000 profit (10% of sales revenue Rs. 30,000).

- (ii) reduce the unit variable cost to Rs. 1/35 e.g. by using cheaper materials or getting high labour productivity.
- (iii) reduce the annual fixed costs by Rs. 1,500 e.g. by careful examination of each cost item and cutting out items that do not result in equivalent benefits.

The export market may offer a means of expanding sales volume. We should sell abroad at the best price we can get (which may be above our price limit in the home market), with a lower limit of Rs. 1/50 plus (i) any additional costs of export sales such as freight, insurance & duty and (ii) a 10% profit margin on the price.

29. (a)	COST S	STATE	MENT	MAY	1966	(Rs.)		
	Т	otal T	A ui	nit st.	B u Total co	nit ost	C u Total c	nit ost.
Materials Direct labour Maint. & dep'n		28,350 6,000 4,350						
(Apportioned on * net sales value)	3	8,700	5166	8/61	10,818	13/52	22,716	22/72
Further processing on A Dipping material Dipping vat dep'n	900 240	1,760	1,760	2/93				16
,, labour ,, other costs (apportioned on total volume)	5400 600	7,140			2,380	2/98	4,760	4/76
Total cost Net profit	-	47,600 4,300	6,926 574	11/54 0/96	13,198 1,202		27,476 2,524	27/48 2/52
Sales revenue	12 7	51,900	7,500	12/50	14,400	18/-	30,000	30/-
*Net sales value (= sales revenue - further processing		3,000	5,740		12,02	0	25,240	

(b) The advisability of selling product B undipped at Rs. 17/- in the long run (compared with selling it dipped at Rs. 18/-) depends on a number of factors.

From a profit point of view, it appears as though profit would be improved since the decrease in revenue (Re. 1/- per unit) would be more than offset by a saving of dipping costs (Rs. 2/98 per unit).

However it is necessary to examine the dipping costs more closely to ensure that they would in fact be saved in the long run. The major item is labour. How much labour would be required for dipping C alone? If only 4 men would be required, there would be a saving of Rs. 1,800/month or Rs. 2/25 per unit of B. This alone makes the proposal worthwhile.

It is also necessary to consider whether sales of B would be affected. If sales decline, bigger unit cost savings would be required to justify the proposal.

30.

Selling price Variable expenses per	Present price 4.00 2.40	Alt. A 3.88 2.40	Alt. B 4.24 2.40	Alt. C 3.20 2.40
Contribution per unit	1.60	1.48	1.84	0.80
Volume (units)	125,000	137,500	106,250	150,000
	Rs.	Rs.	Rs.	Rs.
Contribution	200,000	203,500	195,500	120,000
Fixed expenses	160,000	160,000	160,000	160,000
Net profit	40,000	43,500	35,500	-40,000

On profit grounds, the price should be reduced to Rs. 3.88 per lb.

X. Contribution = Rs. 8/- per unit X. Contrib'n Rs. 9 per	
(15-7) 12,000 @ 8/- = 96,000 unit $(15-6)5000 @ 9/- = 45$	000
Y. Contribution = Rs. 5/- per unit (10-5) 6000 @ 5/- = 30,000 Y. Contrib'n Rs. 5/- as before 3000 @ 5/- = 15, X+Y. Contrib'n = Rs. 9/- per unit	000
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	000
Rs. 126,000 Rs. 123,	000

The proposal would reduce profit by Rs. 3,000 over the coming year. It is apparent that the effect of the proposal is to increase sales of Y from 6000 to 10,000 but to reduce the contribution on each (X + Y) from 13/- to 9/-. If the price of an (X + Y) were fixed higher, say at Rs. 21 or Rs. 22, the proposal might become profitable. Further sales forecasts are required to check this.

32. Marginal costing means the separation of costs that vary with production from those that do not vary with production, for planning and control purposes. Thus, an increase in production will cause a corresponding increase in revenue, but not all the cost items will increase, since some are fixed (at least in the short run, and for small changes in production).

Re

Marginal costing has an advantage over full costing systems in determining the costs that have to be recovered for any short term or temporary increase in sales. The situation often arises that extra sales may be achieved over and above the nörmal level provided a lower price can be offered. In this situation the marginal cost sets the minimum price necessary to recover the extra "out-of-pocket" costs of producing and selling the extra quantity. The actual price will be the highest that can be negotiated; the marginal cost only sets the floor level.

In the long run, or for the majority of sales, the price must cover the full cost, not merely the marginal cost, otherwise a loss will be sustained.

It is advantageous for a firm to sell below marginal cost in the following circumstances:

- (i) when costs have *already* been incurred or committed, e.g. the stock has already been produced, or skilled labour has to be paid whether or not stock is produced, then the firm should sell the stock if the price exceeds further costs of selling. Even though the price does not cover the marginal production and selling costs, if the production cost is already incurred or committed, a loss has already been made, and the firm then considers only further costs such as selling costs, and revenue. If the market price is expected to recover, non-perishable stock will be held in store if the eventual price exceeds the marginal storage and selling costs.
- (ii) stock may be sold below marginal cost in order to build up a demand, e.g. on launching a new product or to eliminate competition, but it may be difficult to raise the price to an economic level later.
- (iii) stock may be sold below marginal cost as a "loss leader", i.e. to increase sales of other products in the same shop.

33. (a) Price for new contract

(i) Absorption costing basis

Preservative 1 can @ Rs. 40 Direct labour 7 hours @ Rs. 3/33 Variable overhead, 300% on direct labour	 40 23/33 70
Factory cost Fixed overhead, $62\frac{1}{2}\%$ of factory cost	 133/33 83/33
Total cost Profit, 20% of total cost	 216/66 43/33
Selling price	 260

(ii) If direct material is limiting factor

From budget, contribution from	5000	cans is	Rs.	380,000,	01
Rs. 76 per can.					
Preservative 1 can @ Rs. 40				40	
Direct labour 7 hours @ Rs. 3/33				23/:	33
Variable overhead 300% on direc		ur		70	
Variable cost				133	/33
Add: contribution to fixed costs a	& prof	it;			
1 can @ Rs. 76				76	
Selling price			I	Rs. 209	/33

(iii) If direct labour is limiting factor

From budget, contribution from Rs. 25/33 per hour.	n 15,000 hour	rs is Rs. 38	0,000 or
Variable cost as above		Rs.	133/33
Add: contribution to fixed cost	s & profit		
7 hours @ Rs. 25/33	• •		177/33
		Rs.	310/66

(b) Since the limiting factor in April and May is likely to be direct labour and since the new contract is relatively labour intensive the minimum price is Rs. 310/66 per fabrication unit. At this price, the firm would be getting a return on labour equivalent to the budget average. The recommended price is the highest price that can be negotiated above Rs. 310/66.

If the customer can be persuaded to take delivery in September, the minimum price may be reduced to Rs. 260 (if this contract is within the budget) or Rs. 209/33 (if the contract is incremental to the budget).

The lower minimum price applies on the assumption that direct labour will be available for this contract in August/September without drawing labour from other jobs. As before, the recommended price is the highest price obtainable above the minimum.

Note to students: When a resource is in limited supply, the marginal cost of a contract should include the opportunity cost of losing contribution elsewhere. If the above contract represents extra revenue over and above the budget (i.e. the sales manager will commit himself to achieving total revenue of Rs. 780,000 plus this contract), the price may be reduced to the marginal cost, but while adequate supplies of preservative are difficult to obtain, this marginal cost includes the Rs. 76/- per can of preservative obtainable from other jobs. If both labour and preservative were in ample supply, the price could be dropped to Rs. 133/33.

34. (a) Quotation on "free issue" material

Direct labour – machine shop $3\frac{1}{2}$ hrs. @ 2/50	Rs.	8/75
- assembly 1 ³ / ₄ hours @ 2/-	但是有意思	3/50

N.B.—This is based on the customer providing the material himself.

- assembly 1\frac{3}{4} hours @ 2/-		3/50
Factory overhead – machine shop $3\frac{1}{2}$ hrs. @ 5/- – assembly $1\frac{3}{4}$ hours @ 1/80	il noire our, achie ceyork	12/25 17/50 3/15
Production cost (excl. materials)	Ti Die	32/90
Administration, selling and distribution: 35%* of 32/90		11/52
Total cost (excl. materials)		44/42

^{*}This percentage is based on the budget administration selling and distribution costs Rs. 221,390 divided by production costs other than direct materials Rs. 637,900.

(b) Quotation on brass strip 50 lbs brass strip @ Re. 1/- per lb. Labour and overhead, assume as above	••	Rs. 50/- 32/90
Production cost Admin. selling and distribution 25% x 82/90		82/90 20/73
Total cost		103/63
(c) Quotation on steel strip 50 lbs steel strip @ Re. 0/50 per lb.	ontag Se	Rs. 25/-
Labour and overhead as above		32/90
Production cost Admin. selling and distribution 25% x 57/90		32/90 57/90 14/48

The difference in the last two costs is due to the difference in material costs and the 25% added for admin. selling and distribution costs. This contract is material intensive compared with "normal" jobs, so it may not be fair to charge the 25% average for recovery of admin. selling and distribution costs; if these costs vary more closely on the labour content, the figure of Rs. 11/52 may be substituted in the last two quotations, reducing them to Rs. 94/42 and Rs. 69/42 respectively.

It can be seen that the present price of Rs. 60/- (based on steel strip) is quite inadequate to recover costs, let alone make a profit. However, in the short run, it covers the marginal cost of Rs. 37/25. Rs. 25/- + labour 12/25).

SECTION IV

FINANCIAL PLANNING

4.1 FORECASTING, PLANNING AND BUDGETING

In section 2.2 the idea of a planned profit was discussed. This was the minimum profit the firm needed in order to survive in the long run. It is not of course necessary or even possible for the firm to make exactly this profit every year, but in the long run the bad years must be cancelled out by good years so that the minimum is achieved.

In any particular year therefore the firm will make the best profit it can having regard to the prevailing circumstances.

One question is: is it worthwhile for a firm to plan its profit and other objectives for each year? Planning takes a lot of time and effort and many firms, especially smaller firms, are too pre-occupied with day-to-day problems to think seriously about the future. The short answer to this is that most business failures are due to lack of planning.

Planning and budgeting must be clearly distinguished from forecasting.

A forecast is a prediction of what is expected to happen if the firm adopts a certain policy, e.g. what will next year's sales be if the existing prices, terms of sale, channels of distribution, salesman incentives, etc. remain unchanged? What will sales be if the price is cut 10%? or if 3 more salesmen are hired? or 2 more retail outlets are opened? Similarly, for production and other functions.

From the forecasts it can be seen which course of action is best in terms of the general objectives of the firm. *Planning* is the process of formulating alternative policies, forecasting the effects of each policy, and selecting the best set of policies. This set of policies becomes the plan.

A plan is therefore more than a forecast. It is a co-ordinated statement of what steps will be taken and what will be caused to happen. Usually it is *programmed* or scheduled so that each person involved can see what he individually has to do and when and what results are to be achieved. In this detailed form it is not only a declaration of intention but also a blueprint for action.

A plan set in financial terms is called a *budget*. A budget is "a financial and/or quantitative statement prepared and approved prior to a defined period of time of the policy to be pursued during that period for the purpose of attaining a given objective" (ICWA).

The alternative to planning ahead is planning to meet contingencies and solve problems only as they arise. This is inefficient and wasteful since many problems can be avoided altogether by pre-planning; most business failures are due not so much to adverse economic conditions but to a failure to anticipate the conditions and to take suitable steps in advance.

It is sometimes claimed that it is not worth planning, especially in a rapidly changing environment, since the very first major change will upset the whole plan and make it out of date. This is not an argument against planning, but in favour of realistic planning over a period in which most changes can be foreseen, (see section 4.4) also in favour of flexible plans instead of fixed plans, (see section 4.7), and in favour of broad plans instead of excessively detailed plans.

Undoubtedly planning requires a certain mental attitude. This can be described as a sense of purpose, or a preoccupation with future goals and means of reaching them. The non-planner, by contrast, is blown about by day-to-day circumstances, which seem to him to be outside his control, and in fact so they are since his opportunity of controlling them has passed. "Today is the realisation of yesterday's plan, or lack of plan".

The advantages of planning and budgeting are as follows:

- (i) planners are forced to think about their objectives and policies, and inconsistencies are shown up;
- (ii) planners are forced to think realistically about how their objectives may be achieved;
- (iii) in doing so, they anticipate their problems, putting themselves in a better position to meet them;
- (iv) when the plans of individual managers or units are compared, inconsistencies can be seen and eliminated; it is possible to co-ordinate individual plans and to ensure that in total they meet the objectives of the firm;
- (v) a plan is a basis for control of those responsible for its performance, by comparing actual results against the planned results, and investigating differences, e.g. budgetary control;
- (vi) if managers participate in the preparation of a plan they are better motivated to implement it, and better informed on their part in the total plan and what is expected of them;
- (vii) a firm with a clear plan is in a better position to raise finance since it can demonstrate its ability to repay.

4.2 TYPES OF PLANNING

Every manager having responsibilities must plan how to carry out his responsibilities. It is a common misconception that subordinates merely execute the plans made by their superiors. In fact each subordinate must plan how he is to do what is required of him, right down to the supervisor and charge-hand level. At the top level plans are in broad terms; they become more and more detailed at successively lower levels.

Planning is often divided into long term and short term planning. Long term planning, also called corporate planning or development planning, means broad planning for more than one or two years ahead. This is mainly concerned with the expected growth of the market and of the firm's share of the market, the future plant and other facilities required, technological changes, capital needs and how these will be financed, and manpower needs especially skilled manpower which may take years to build up. Even though the future may be very obscure, it is essential to have some idea of the future scale and character of business as a framework of reference for long-term decisions on capital expenditure, funding, pricing, research and development, personnel recruitment and training. A five or ten year period is common, but in some capital intensive industries, such as electricity generation, plans (or at least forecasts) are made for even longer periods.

Short term planning is planning over periods up to a year or so. Short term planning is carried out at all levels of the organisation.

Planning has been classified as follows:-

- (i) Formulation of goals or objectives, and policies within which the firm will work to attain its objectives. (Sometimes this is regarded as a pre-condition of planning, rather than a part of planning itself). Objectives may include financial objectives such as a minimum profit on capital employed, maximum risk level, stability etc. and other objectives such as market leadership, product reputation, etc. Policies may be set to govern the firm's relations with customers, suppliers, employees, etc.
- (ii) Strategic planning, that is planning the future products of the firm, what sort of business it should be in, whether it should expand or diversify, how it can exploit its relative strengths and remedy its weaknesses, especially in the long term, to meet its objectives.

In this area, financial evaluation plays only a limited role, since alternatives (even if they are perceived and clearly formulated) cannot usually be worked out in terms of cash flows.

(iii) Organisation planning is arranging the organisation structure so that all functions become personal responsibilities with appropriate authority, and arranging work flows, information flows, channels of distribution, and location of facilities.

This is the field of work study, organisation and methods, and operations research. Alternative organisation structures, methods of work, channels of distribution, etc. should be evaluated from a financial point of view, e.g. which arrangement will cost least. Personnel objectives and policies will of course also be important in organisation planning.

(iv) Resource planning is concerned with the acquisition and development of resources: raw material sources, personnel recruitment, training and development, sources of finance and acquisition of facilities and equipment.

Generally speaking, the financial preference will be to obtain necessary resources from the cheapest sources, subject to quality and reliability of supply. A large firm for instance, may find it cheaper to train its skilled personnel and retain them by good personnel policies, than to rely on recruiting trained personnel in the market.

For sources of finance, see Section 5.

(v) Operations planning is concerned with the allocation of resources to the various product lines and departments of the firm, and scheduling or programming operations. This planning is both periodic (e.g. the annual budget), and ad hoc, i.e. planning for new opportunities and unforeseen contingencies.

4.3 FUNCTIONAL AND OTHER BUDGETS

A comprehensive system of budgets includes budgets for:

- (i) sales (quantities and revenue)
- (ii) production (including purchasing) (quantities and costs)
- (iii) administration costs
- (iv) selling and distribution costs.
- (v) research and development costs.

The above are known as functional budgets since they each relate to a major function of the business. In total, they constitute the operations budget. They are combined with budgets for:

- (vi) stocks (raw materials, work in progress, and finished goods)
- (vii) debtors
- (viii) creditors
 - (ix) capital expenditure (purchase of new fixed assets, replacements, and disposal of fixed assets)
 - (x) cash (from all above, and including tax, dividends, and capital increases and repayments)

(rupees and foreign exhange shown separately)

to make up

- (xi) a master operating budget (Profit and Loss account)
- and (xii) budgeted Balance Sheet (projected Balance Sheet).

Not all businesses use budgetary control comprehensively. Many firms budget sales, production costs, etc. but assume that stocks, debtors and creditors will not change. It is important, however, always to budget cash since the penalty of not doing so might be insolvency. Conversely, it is uneconomic to carry an excessive cash balance, which earns no interest.

4.4 PERIOD COVERED BY BUDGET

Most firms plan operations on an annual basis since the law requires actual results to be reported annually, and it is usually possible to forecast the effects of policies over this period. (In practice, forecasts go forward up to 18 months since budget preparation starts up to 6 months before the year to which it refers).

In old established stable industries, it may be possible to set a budget for two years ahead which will remain sufficiently realistic to provide a basis for control throughout the period. This is an advantage since budget preparation is a long and costly exercise.

Conversely, new industries or industries with a rapidly changing technology or environment may require more frequent budgets. The budget period may be reduced or, more often, the budget is set for the year, but revised quarterly or when it is thought necessary.

A device used by some companies is the *rolling* plan. This commonly covers a two-year period. Each year the first year of the plan is revised and a second year added. This allows longer term planning, while keeping the plan up-to-date as a basis for control.

If the budget period covers fluctuations in business activity, such as seasonal fluctuations, comparisons can be made from one budget period to the next. An annual basis, for instance, allows the comparison of one year's budget or actual results with the next year's without regard to seasonal fluctuations, but of course will still be affected by trade cycle fluctuations.

For control purposes, the budget is broken down into short control periods, such as months.

4.5 OPERATIONS BUDGET

The first is to show the revenue and costs of each separate product (or service in a service industry) and the second is to show the output to be achieved and the costs to be controlled by the manager of each separate cost centre. These are two quite different analyses of the same plan of operations, and they serve different purposes. The analysis by product, called a program budget, enables the costs and revenues of each product to be compared so that management can review the profitability and performance of each product before approving the budget. The analysis by cost centre is for subsequent control. A budget set out this way is sometimes called a control budget, or responsibility budget.

This two-way analysis is essential for adequate review and control. Usually a product is not the entire responsibility of a single manager (even in the so-called product manager organisation): one man is responsible for purchasing production materials, another for training operatives, various others for the different stages of production and distribution,

another for securing sales orders, and so on. While planning is essentially concerned with separate products, programs, or activities, control is concerned with separate responsibilities, and only occasionally is the whole of an activity within a single responsibility or cost centre.

Example:

(A) Program budget for 1970

	Total	Printed Cambric	Dyed Cambric	Voile	Batik
Sales-Quantity -Revenue	1,000,000	120,000 yds. 420,000	100,000 yds. 350,000	55,000 yds. 170,000	2,500 articles 60,000
Variable costs Production Selling and Dis-	350,000	120,000	105,000	105,000	20,000
tribution	60,000	24,000	20,000	13,000	23,000
Contribution	590,000	276,000	225,000	52,000	37,000
Fixed costs Production Administration	150,000 100,000	60,000 40,000	40,000 35,000	41,000 20,000	9,000 5,000
Selling and Distribution	90,000	36,000	30,000	18,000	6,000
	340,000	136,000	105,000	79,000	20,000
Net Profit Rs.	250,000	140,000	120,000	-27,000	17,000

- Note (1) This budget separates fixed costs from variables so that the effect of increasing or decreasing the scale of each activity can easily be calculated. In this example, it can be seen that though voile makes a loss, this is after bearing Rs. 79,000/- of fixed charges. If voile were discontinued, these fixed charges would have to be loaded onto the remaining products, and the overall effect would be to lose the Rs. 52,000/- contribution from voile. Voile should not be discontinued unless this would release facilities for extra production and sale of other products resulting in at least Rs. 52,000/- extra contribution on these other products.
 - (2) Only four main products or groups of products are shown. In practice these would be further subdivided.

Note how this form of presentation facilitates top level review. Long familiar in the private sector, it is now being introduced in Government Department budgets.

(B) CONTROL BUDGET

General Mana- gement	1400	14,500				14,500 21,000 3,200 9,800	80,400	per sche- dule
Purch asing	900	3,200			14,800			
Acco- unts & Admin.	1,000	8,100 17,800 2,800	17,000 5,500	7,200 6,900 3,500 3,900	3,000		76,700	per sche- dule
Pers- onnel	200	5,700 10,200 100					16,200	per sche- dule
Qua- lity Control	250	14,200					27,150	per sche- dule
Main- tenance	10,700	6,700 11,100 15,300 10,800 18,700 14,200 5,700 11,300 4,700 5,400 9,600 8,300 12,700 10,200 36,000					55,400 16,000 34,350 20,550 38,300 27,150 16,200 76,700 27,000	per sche- dule
Produ- ction t Servi- ces	150	9,600					20,550	per sche- dule
	5,400	5,400			8,100		34,350	50,000 miles
Store Despatch	200	4,700					16,000	90 per sche-
Sales Office	1,100	6,700 11,300 36,000				CONTRACTOR OF THE PARTY OF THE	55,400	per Rs.1,000,000 per sche- revenue sche dule dule
Dyeing & blea-ching Dept.	12,300	31,400 13,800 2,800	2,800					per Rs sche- dule
Wea- I ving Dept.	2,000 12,300	47,100 22,200 4,500	3,900				79,700	yds.
Spinn- ing Dept.	39,000	33,500 15,100 2,100	2,300				95,000	60,000 280,000 lbs. yds. yarn cloth
Re- search Dept.	3,000 1 4,000 50	3,200				Trials.	20,1501	per 60,000 schedule lbs.
Total	142,000 3,000 139,000 10,700 21,300 4,000 3,000 7,900 50	209,000 164,000 12,800 36,000 15,500	17,000 14,500	7,200 6,900 3,500 3,900	8,100 14,800 3,000	14,500 21,000 3,200 9,800	750,000 20,150195,000 79,700 63,100	
	Cost-Materials Raw cotton Maintenance parts Dyes & chemicals Petrol & Oil Stationery		Rent & rates Electricity	Printing Postage & Tel. Audit fees Legal fees	Vehicle Licences Freight Insurance	Buildings Plant & Machinery Furniture etc. Motor vehicles		Outputs

- Note (1) The control budget shows the total cost of inputs and the quantity or value of outputs (scheduled separately where they are many and varied) for each cost centre. Each cost item is included under the centre by which it is controlled. (The responsibilities of departments vary from one firm to another: this firm is illustrative only). For instance, electricity for power is allocated directly to production departments since each department has its own meter; all other electricity is the responsibility of the accountant who passes the bills.
 - (2) No apportionments are made in a control budget since it shows only controllable costs in each centre, not the full costs. For instance, depreciation on plant is the responsibility of the general manager since he authorised the purchase of plant. In the cost accounts, this will be apportioned to the production departments and it will eventually get into the fixed production overhead of each product, per the program budget.

4.6 FINANCIAL EVALUATION OF THE BUDGET

The operating budget is a plan for the coming year, which has been determined out of a number of alternative possibilities, e.g. as to the relative mix of sales products, the methods of manufacture, whether to work overtime or an extra shift, whether to make components or buy them from outside, how much to spend on market research, advertising, product research, process development, management development, etc.

The financial evaluation of these alternatives follows the same principles as given above, though the number of alternatives is usually too great for full evaluation. For this reason, simple planning models such as the break-even chart (section 4.7) have been devised, which give a rough idea of the profit outcome of various alternatives.

Whereas capital expenditure is evaluated in detail when the time comes to get approvals to commit the company, current expenditure is usually taken as financially approved on the approval of the budget. Therefore the budget is usually the first and last opportunity to screen the bulk of current expenditure. New items or significant increases in existing items should be carefully scrutinised. The management accountant should ensure that every rupee of cost budgeted will provide at least a rupee of benefit (insofar as the benefit can be evaluated), and that objectives are attained at lowest cost.

For this purpose, the program budget which relates costs to revenues is more useful than the control budget.

4.7 BREAK EVEN ANALYSIS

A useful planning tool in the outline budget stage is the *break-even* chart. This is a graph, with volume of production and sales of a single product shown on the horizontal co-ordinate, and money on the vertical co-ordinate. On this, two planning lines can be plotted:

(i) the total cost of producing and selling different volumes of product and (ii) the total revenue for different volumes.

There are two methods of estimating total cost at each volume:

- (i) plot past costs, adjusted for expected future changes, at various volumes achieved in the past. From these points the line of best fit may be drawn. (This may be drawn by hand or, more accurately, by the statistical method of least squares). Many of the plotted points will not lie on the line, but close to it; it is assumed that deviations are due to a multitude of small and temporary fluctuations which need not be planned for since in the long run they cancel out. This line of best fit expresses the estimated future cost over the volume range experienced in the past. It should not be extrapolated far outside this range without evidence of how costs behave at such volumes;
- (ii) consider each cost element in turn, and how it varies with changes in volume. Thus costs such as raw materials, direct labour on operations, and machine power, usually vary proportionately with output volume; therefore, given the cost at one level of output, costs can be calculated at any other level of output. (These are classified as "variable costs" by the cost accountant). Costs such as salaries, rent and rates, legal and professional charges, etc. are independent of volume, at least in the short term and over a limited range of output. (These are classified as "fixed costs" by the cost accountant, though of course they may still vary for reasons other than volume). There are also costs of an intermediate nature ("semi-variable costs") which contain a fixed element and a variable element. The variable element may not be proportionately variable (as were raw material costs, etc.) These should be estimated for different levels of output from experience.

(See Appendix 1 for typical classification of costs)

Using the latter method, we get total cost at each level of output. This may range from nil to over 100% of normal capacity provided the fixed and semivariable costs have been considered over the whole of this range.

The revenue at each volume will in the simplest case be a straight line rising diagonally from the origin.

Example

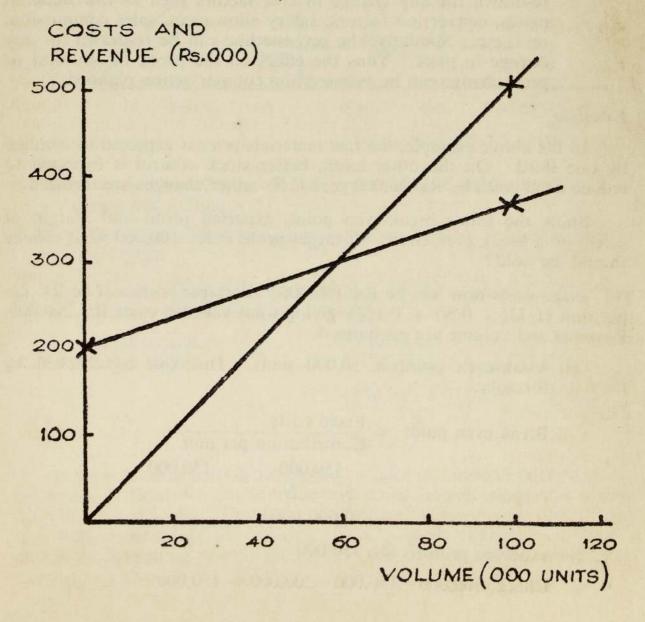
A firm makes a single product which has the following cost structure:

Direct materials Rs.	1/00
Direct labour	0/50
Variable overhead	$0/16\frac{2}{3}$
Fixed overhead (based on 100,000 units)	2/00
	3/663
Profit	1/331/3
Selling price	5/-
	-

Show the above on a break-even chart.

The method of construction is as follows:

- (i) Ascertain the total fixed costs, total variable costs, and revenue at the expected level of output. Total fixed costs here are $100,000 \times Rs$. 2/-=Rs. 200,000. Variable costs per unit are $1/66\frac{2}{3}$ ($1/00 + 0/50 + 0/16\frac{2}{3}$), so total variable costs are $100,000 \times 1/66\frac{2}{3} = Rs$. 167,000. Revenue is $100,000 \times Rs$. 5 = Rs. 500,000.
- (ii) Plan the vertical (money) scale to accommodate Rs. 500,000 revenue and the horizontal (output) scale to accommodate 100,000 units, plus room for expansion along each scale.
- (iii) Plot revenue at expected output (Rs. 500,000, 100,000 units) and draw the revenue line back to the point of origin.
- (iv) Plot total costs at the expected output (Rs. 367,000, 100,000 units) and at nil output (fixed costs only, Rs. 200,000, on the vertical scale), and draw the cost line between them. (It is not necessary or meaningful to show extra lines for fixed costs or variable costs alone).



A break even chart tells management

- (i) the volume at which the firm breaks even, i.e. total cost = total revenue. In this example, the firm must sell 60,000 units to recover its fixed costs and make neither profit nor loss.
- (ii) the *profit* at the expected volume. Profit is the vertical difference between the revenue line and cost line. At 100,000 units, this is Rs. 133,000.
- (iii) the margin of safety between the break even volume and the expected volume. 100,000 60,000 = 40,000 units margin, or 40% of expected volume, i.e. sales could fall by up to 40% and the firm would still make some profit.
- (iv) the volume at which any desired profit would be attained. Suppose the firm's target profit is Rs. 100,000. By moving a ruler acros the chart, it can be seen that Rs. 100,000 profit would be made on a volume of 90,000 units.
- (v) the effect on profit and the margin of safety of any change in costs, selling price, or volume. The cost line can easily be re-drawn for any change in cost factors such as raw material prices, conversion factors, salary allowances, sales commission, rent, etc. Similarly, the revenue line can be re-drawn for any change in price. Thus the effect on the profit of any cost or price change can be assessed and counter-action planned.

Example

In the above example, the raw materials price is expected to increase by one third. On the other hand, better stock control is expected to reduce fixed costs by Rs. 50,000/year. No other changes are foreseen.

Show the firm's break-even point, expected profit and margin of safety on a break even chart. If target profit is Rs. 100,000 what volume should be sold?

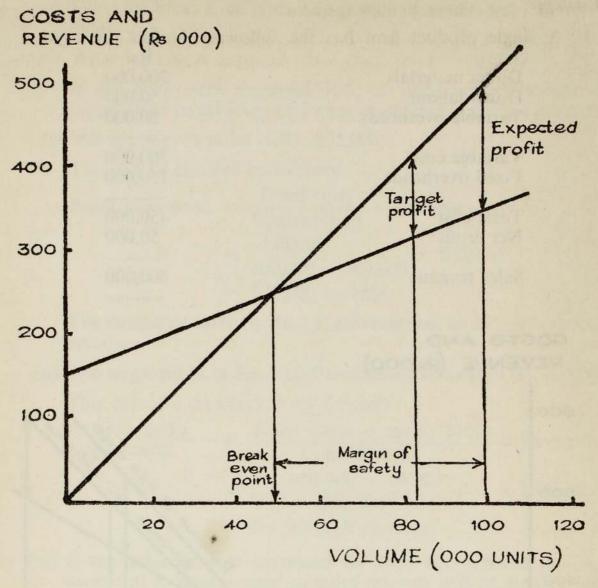
Fixed costs now will be Rs. 150,000. Variable costs will be Rs. 2/per unit $(1/33\frac{1}{3} + 0/50 + 0/16\frac{2}{3})$, giving total variable costs Rs. 200,000. Revenue and volume are unchanged.

(i) break-even point is 50,000 units. This can be checked by formula:

Break even point =
$$\frac{\text{Fixed costs}}{\text{Contribution per unit}}$$

= $\frac{150,000}{5/--2/-} = \frac{150,000}{3}$
= 50,000 units

(ii) expected profit is Rs. 150,000Check, 500,000 - 150,000 - 200,000 = 150,000



(iii) margin of safety is 50,000 units (100,000-50,000) or 50% of expected volume.

The effect of the changes is to improve both profit and the margin of safety.

(iv) Rs. 100,000 profit is achieved at a volume of about 83,000 units. This can be checked by formula:

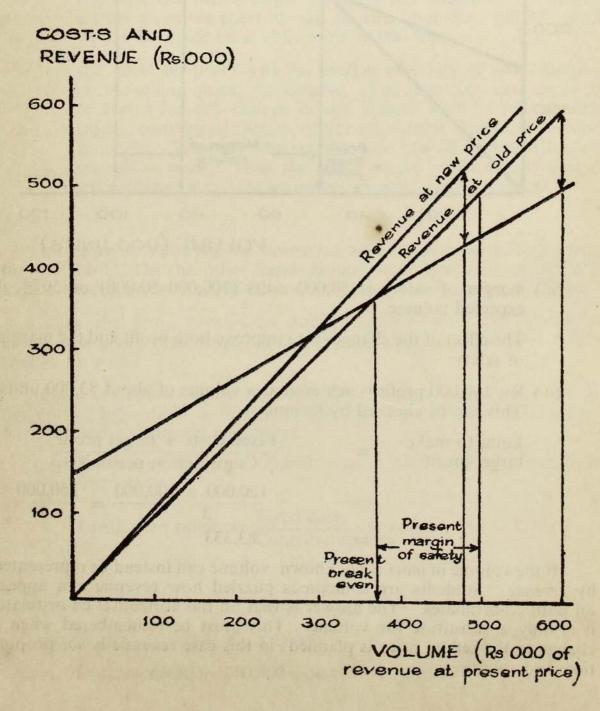
Point to make target profit
$$= \frac{\text{Fixed costs + target profit}}{\text{Contribution per unit}}$$
$$= \frac{150,000 + 100,000}{3} = \frac{250,000}{3}$$
$$= 83,333$$

If the volume in *units* is not known, volume can instead be represented by *revenue*. Students are sometimes puzzled how revenue can appear on both co-ordinates. The answer is that on the horizontal co-ordinate, it is only a substitute for volume. This must be remembered when a change in the selling price is planned; in this case revenue is *not* proportional to volume.

Example

A single product firm has the following budget for 1970:

			Rs.
Direct materials			200,000
Direct labour			50,000
Variable overheads	• •		50,000
Variable cost			300,000
Fixed overheads			150,000
Total cost			450,000
Net profit	1.00	•///•	50,000
Sales revenue	763.		500,000
			The same of the sa



- (i) Show the break-even point and margin of safety on a break-even chart.
- (ii) What volume is required for a profit of Rs. 90,000?
- (iii) If the price were increased 10% at what volume would the target profit be achieved and what would be the margin of safety?
 - (i) The break-even point is Rs. 375,000

This can be checked by formula:

Break even point =
$$\frac{\text{Fixed costs}}{\text{Contribution}} \times \text{Revenue}$$

$$= \frac{150,000}{500,000 - 300,000} \times 500,000$$

$$= 375,000 \text{ revenue}$$

The margin of safety is Rs. 125,000 revenue, or 25% of expected revenue.

(ii) The target profit of Rs. 90,000 is achieved on sales of Rs. 600,000. This can also be checked by formula:

Point to make target profit
$$= \frac{\text{Fixed costs} + \text{target profit}}{\text{Contribution}} \times \text{Revenue}$$

$$= \frac{150,000 + 90,000}{200,000} \times 500,000$$

$$= \text{Rs. } 600,000 \text{ revenue.}$$

(iii) If the sales price is increased by 10% the revenue line will ascend at a steeper angle as more revenue will be made at any volume. This cannot be plotted if the volume dimension is in terms of revenue, but is possible if a unit selling price is assumed e.g. Re. 1/-. The volume line then shows units in thousands. On 500,000 units, the revenue at the new price will be Rs. 550,000.

Point to make
Rs. 90,000 profit
$$= \frac{150,000 + 90,000}{550,000 - 300,000} \times 550,000$$
$$= Rs. 528,000 \text{ of revenue at new price}$$
$$\text{or } \frac{10}{11} \times 528,000$$
$$= Rs. 480,000 \text{ of revenue at old price}$$

The new break-even point would be:

$$\frac{150,000}{250,000} \times 550,000$$
= Rs. 330,000 of revenue at new price or $\frac{10}{11} \times 330,000$
= Rs. 300,000 of revenue at old price.

The margin of safety from new break even to target profit would be 528,000 - 330,000 == Rs. 198,000 of revenue at the new price.

Volume can also be represented in standard hours or in terms of percentage of full capacity. Similar difficulties arise if the output per standard hour changes, or if the definition of full capacity changes (N.B. Expected volume should not be assumed to be 100% capacity. Normally plant works at rather less than full capacity).

Break even charts come in various forms. Instead of plotting total costs and total revenue, unit costs and unit revenue (selling price) may be plotted at different volumes. This shows a declining cost curve cutting a horizontal price line. The point of intersection is the break even volume. At any expected volume the unit profit and margin of safety can be read off the chart.

A common form is the *profit graph*. This shows the profit or loss on the vertical axis and volume (or its equivalent in revenue) on the horizontal axis. In effect the cost line and revenue line are combined into a single line. The slope of the line represents the profit/volume ratio.

Example

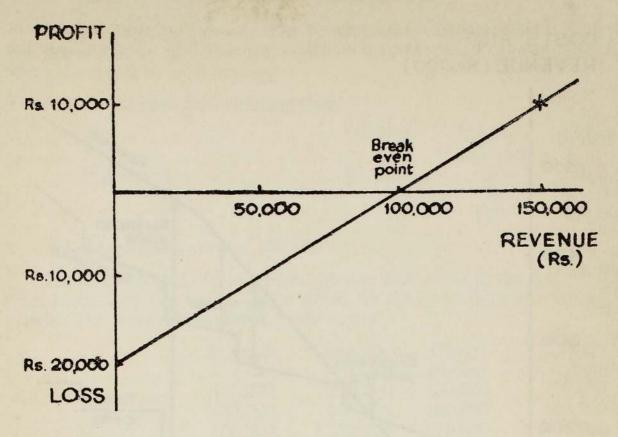
A transport contractor has the following budget:

			Rs.
ages			40,000
owances			20,000
	• •		30,000
			15,000
••			15,000
			120,000
		8,000	
		5,000	
		1,000	
	• •	6,000	20,000
			140,000 10,000
•••	• • •		10,000
			150,000
	owances	owances	

Show the above on a profit/volume graph.

The graph opposite shows the break-even point, profit and margin of safety at the expected revenue, and revenue necessary to achieve a target profit, as in a break-even chart. It is perhaps not quite so convenient a form of chart for planning cost and revenue changes.

The angle of the profit line (sometimes called "marginal income slope") represents a profit/volume ratio of 20% (10,000 profit \div 50,000 revenue margin of safety).



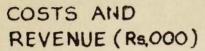
4.8 LIMITATIONS OF BREAK-EVEN ANALYSIS

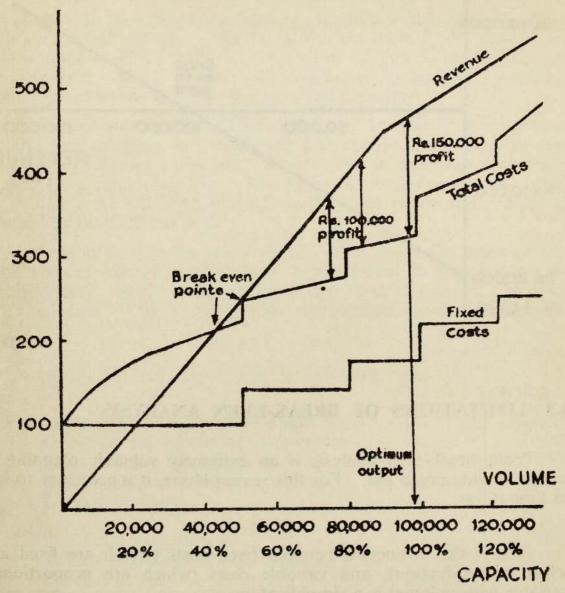
Profit break-even analysis is an extremely valuable planning tool and is in widespread use. For this reason alone, it is necessary to know its limitations.

Firstly, the distinction between fixed costs (which are fixed at all levels of production), and variable costs (which are proportionately variable with volume) is a simplification.

In a more realistic model, costs will not be described by a straight line. Fixed costs tend to be stepped, i.e. they increase over a wide range of production by stepping up at particular points, e.g. a supervisor's salary is fixed, but if production is increased too far, an extra supervisor will be necessary. Also variable costs are not all proportionately variable; some, such as fuel for heat processes, are less than proportionately variable, while others, such as overtime, are more than proportionately variable. All costs tend to rise more steeply above normal capacity.

Also, we may not be able to get the same price on high levels of output as on lower levels; the revenue line becomes a curve with a decreasing slope. If a business gets, say Rs. 5/- a unit on sales up to 90,000 units, then only Rs. 2/50 per unit on sales over 90,000, we may get a break even chart resembling the following:-





This shows two break even points, at about 45,000 and 50,000 units. If we projected the cost and revenue curves further, we would have a third.

If the target profit is, say, Rs. 100,000, this may be made at about 75,000 or just over 80,000, due to the step-up at 80,000.

This chart, however, shows that maximum profit is made just before the step up at 100,000 (about Rs. 150,000). This is known as the optimum output. (It is not shown in the simple chart.)

Secondly, the break-even chart cannot cope with more than one product (or a fixed mix of products), where fixed costs are common to all products. It is, of course, possible to apportion fixed costs over the different products and to construct a chart for each product, but apportionments are somewhat arbitrary and have no meaning for short term decisions.

The profit graph however can be adapted for two or more products. The method is to plot the profit line in segments, one segment for the planned volume of each product.

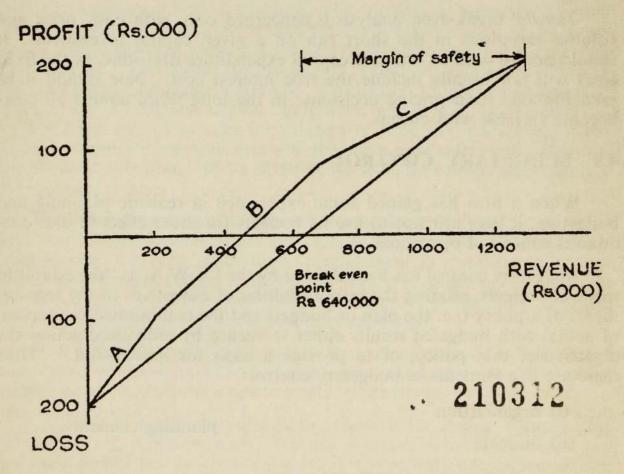
Example: We have the following data:

		Selling	Variable	Volume
Product A		Price Rs. 10/–	unit cost 5/–	20,000
В		8/-	5/-	60,000
C		15/-	12/-	40,000

Total fixed costs are Rs. 200,000.

These are plotted one at a time, starting with a loss of the Rs. 200,000 fixed costs, and turning it into a profit by the contribution from each product (i.e. revenue minus variable costs):

		Revenue	Cumulative	Contri-	Cumulative
	*:		revenue	bution	contribution
A		200,000	200,000	100,000	100,000
В		480,000	680,000	180,000	280,000
C		600,000	1,280,000	120,000	400,000



From this it can be seen that the production and sale of A makes up Rs. 100,000 of the initial "loss" of Rs. 200,000, B makes a further Rs. 180,000 (though at a slower rate per rupee of revenue), taking the cumulative result to a profit of Rs. 80,000, and C adds Rs. 120,000 (at a slower rate still) resulting in total profit of Rs. 200,000. (The order in

which the products are plotted is not significant, though it is usual to start with those making most contribution to profit per rupee of revenue, i.e. the highest profit/volume ratio).

The straight line from -200,000 to +200,000 represents the average profit/volume ratio for *this mix* of products. In this example it is 31% (200,000 profit \div 640,000 revenue margin of safety).

Note that the point where product B crosses the line is of no significance.

The effect of making more or less of any product can be seen by lengthening or shortening its segment. However, where products share production or selling facilities, care should be taken to allow for effects on other products. For instance, if we make only 20,000 of C, we lose Rs. 60,000 profit on C, but we may thereby release machine time for producing more A or B, and this may result in a net increase in profit. Conversely, if we sell more C, we make more profit on C, but we may thereby lose production on sales of A or B, resulting in a lower overall profit. The general rule is to produce and sell as much as possible of the product showing the highest contribution per unit of limiting factor (not the highest profit/volume ratio necessarily).

Thirdly, break-even analysis is concerned only with cost, price and volume variations in the short run on a given capital investment. It should not be used to evaluate capital expenditure decisions, as the fixed costs will not usually include the true interest cost. Nor should it be used for long term pricing decisions: in the long term, almost all costs become variable with output.

4.9 BUDGETARY CONTROL

When a firm has gained some experience in realistic planning and budgeting, it may attempt to use its budgets for more effective and continuous control of operations.

Budgetary control has been defined by the I.C.W.A. as "the establishment of budgets, relating the responsibilities of executives to the requirements of a policy (i.e. the plan or budget) and the continuous comparison of actual with budgeted results either to secure by individual action the objective of that policy, or to provide a basis for its revision." Thus there are five elements in budgetary control:

(i)	organisation	planning elements		
(ii)	budgets			
(iii)	accounts and other quantitative information			
(iv)	comparison	control elements		
(v)	action	1		

It is as important to define the duties and responsibilities of each manager (organisation) as it is to set his budget, otherwise a manager can always keep within his budget by claiming that certain duties are not his.

So far as possible, there should be no overlapping (or underlapping) of duties, nor joint responsibilities. If decisions are made by committee, this weakens budget responsibility – who is to be held accountable?

The person responsible for each budget is called the "budget holder". Usually each manager having control of resources (personnel, supplies, etc). has a cost budget, and each sales manager responsible for achieving revenue has a revenue budget as well as a cost budget for his own department.

For budgetary control, of course, a control budget is essential; a program budget would not be so useful. The control aspects of budgetary control are fully covered in Section 6.

4.10 LIMITING FACTORS AND CO-ORDINATION

In all but the smallest firms, so many activities are inter-dependent that forecasts have to be successively revised to ensure that they are all mutually consistent. For instance, the projected quantity of each product sold must not be more than what will be produced, plus opening stocks, minus planned closing stock, unless the firm can buy the product from outside. The budget for production is similarly related to purchases and opening stocks of raw materials. Production should not be budgeted unless there is adequate capital equipment, which will require adequate maintenance, etc. The sales mix, design of products, packaging, distribution, promotion methods etc. will affect not only sales, but selling and distribution costs also. Most of the above will affect the general administration costs.

The budgeting process commonly resembles a trial-and-error procedure in which successive drafts are more highly detailed, articulated and co-ordinated. At the same time, management is considering all the alternatives open to them in the coming year, and selecting the combination which will show the best results (in terms of profitability, liquidity and risk, and in terms of non-financial criteria also).

A company budget often starts with a sales forecast for the coming year, based on existing prices, product mix, sales methods, etc. except for any policy changes that are to apply in the budget period.

The sales forecast may, however, show a far higher volume than the firm can produce because of some expected shortage such as raw materials, skilled labour, capital funds for equipment or foreign exchange or licence for imports. This is called the limiting factor (or key factor, or principal budget factor). In this case, the budget starts with a production forecast, based on the expected quantity of the limiting factor, and on existing methods of production. Account is taken of expected business conditions, raw material prices, pay increases, etc.

From the opening stocks, forecast sales (or production), purchases of finished goods (if any) and desired closing stocks, the necessary production (or sales) may be found, and the profit or loss calculated.

Attempts are then made to improve on this result by changes in the mix of production, in production methods, sales methods, sources of supply, etc.

These forecasts are usually outline estimates only at this stage, since it would be a waste of time to go too far into detail. However, it is important to identify limiting factors as early as possible; for instance it would be unfortunate to base the budget on an expected production capacity, and only discover at a late stage that a machine is liable to break down and that certain spares are unobtainable.

This preliminary planning stage requires close co-operation and consultation between the heads of departments and the Chief Accountant (or management accountant). Once agreement has been reached on an outline plan which is internally consistent and acceptable to the directors, work can proceed on detailed budgets. However, it will still be necessary to maintain co-ordination by making a single person responsible for collecting and checking individual budgets. This is usually the chief accountant (or controller), or management accountant. Co-ordination is often achieved by constituting those concerned as a Budget Committee, especially at the preliminary planning stage. Overall responsibility to the Board for the budget remains, of course, with the managing director.

4.11 PERSONNEL CONSIDERATIONS

The main advantage of budgeting is that it develops the habit of forward thinking throughout the organisation, and reveals difficulties, shortages and inconsistencies between the objectives of different departments before the event.

Therefore, budgeting must be done by the man on the job; centralised budgeting will not improve his planning. Each manager and supervisor budgets his own operations with only guidance and review from the top.

This also results in more realistic and workable budgets, since it is not possible for, say, the management accountant or budgets manager to work out all the practical implications of a plan.

Decentralised budgeting fits in well with the findings of recent management research into motivation and productivity. When men participate in the planning of their own jobs, they take greater interest in their own performance in relation to those plans. Reasonable standards of performance are agreed and explicitly defined, so that each man knows what his superior expects of him. When he is drawn into the co-ordination of his budget with other departmental budgets, and has to reconcile conflicts and inconsistencies, he appreciates more how he fits into the total picture.

Before World War II the budget was seen mainly as a device for control i.e. control imposed from above. Many firms still operate their budgets this way. Budgets are set centrally. In some cases lower level managers and supervisors are not even informed of their budgets (on the ground that if the budget turns out to be too loose, this would be exploited). The budgets are then used as disciplinary clubs rather than as guides to performance. If a manager exceeds his budgeted costs, the "corrective action" is usually a reprimand rather than investigation of the reasons for variance. If a manager achieves his output within his budget, commendation is rare.

The natural reaction is that the budget is resisted by those who feel their liberty thereby reduced. Co-operation is in no way encouraged; rather the reverse since each manager is individually accountable and is mainly concerned for himself.

When budgeting or budgetary control is to be introduced in a firm for the first time, it is the older concept that will be in people's minds. Ordinary resistance to change will be reinforced by fears of loss of freedom, loss of discretionary content in the job, and loss of status. It should not be imagined that budgetary control can be introduced by simple fiat. It is a gradual and educational process, requiring a carefully planned program over a period of at least two years. The elements in the program are as follows:—

- (i) understanding of the *need* for budgetary control (e.g. efficiency to meet competition).
- (ii) the nature and advantages of budgetary control to the man on the job, e.g. he gets the men, materials and other resources he needs to do the job without hold-ups due to lack of co-ordination; satisfaction of doing a job without frequent (unplanned) changes in priority, etc.; co-operation of his colleagues;
- (iii) forward orientation, e.g. each man to put down what he thinks his superior wants him to do, in quantitative terms as far as possible; work out the key results expected of each jobholder,
- (iv) how the reporting system will work, and how it will be used, i.e. by the man on the job.

Where men have been used to having all their planning done for them by their superiors, it is unrealistic to think that they will take to participating in planning and budgeting their own jobs like ducks to water. Responsibility is a tender plant that requires careful nurture. Therefore decentralisation should be gradual, not precipitate. In the early stages the central budgeting and accounting departments will have to involve themselves more closely in the drafting of budgets; these should be worked out with (or at least reviewed by) operating levels.

4.12 BUDGETING PROCEDURE

Procedures vary widely, but a typical sequence is as follows:-

- (i) a top level Budget Committee considers past performance in relation to the company plan and long term objectives, current economic, political and business conditions, outlook for the industry, and probable limiting factors applying to the budget year. From this a preliminary or outline budget is drafted, based on the expected quantity of the limiting factor(s).
- (ii) Board of Directors amends or approves the outline budget.
- (iii) detailed budgeting starts on sales, production, administration, selling and distribution, and research and development, within the outline budget, on a timetable laid down by a budget coordinator (e.g. cost or management accountant).
- (iv) operating budgets are drafted by those responsible for their execution, with review of standards and assumptions by their superiors up the "chain of command".
- (v) budgets are first drafted in terms of the *physical quantities* of all resources required (men, materials, machines, space, etc.) to produce the goods and services called for in the outline budget.
- (vi) responsibility for checking that these resources are or will be available must be assigned; any shortage may be a new limiting factor and have repercussions on other budgets.
- (N.B. If budgets are first drafted in money terms, physical shortages may be discovered only when it is too late).
 - (vii) the quantity of each input resource for a given output, or the quantity per unit of output, is a very important figure, e.g. tons of limestone per ton of cement, labour hours per radio set assembled. These are known as conversion factors or technological co-efficients. They express the efficiency with which inputs are converted to outputs, quite independently of purchase prices, labour rates, and selling prices, and are used for flexing budgets and analysing variances. (N.B. If all budgeted costs show the relevant conversion factors and prices, the budget can quickly be revised for changes in either).
 - (viii) the management accountant maintains a financial evaluation service throughout the budgeting process so that alternative methods of operating can be compared, costs reduced, and profit improved.
 - (ix) the budget co-ordinator ensures that all departmental budgets are prepared on the same assumptions and that inconsistencies are reconciled; any inconsistency with the outline budget is brought to the attention of the Budget Committee.

- (x) the management accountant, working with line managers, the purchasing manager and personnel manager, puts expected prices on all resources required and multiplies out to get the expected total costs, distinguishing any foreign exchange costs and revenues from rupee costs and revenues.
- (xi) the management accountant will also prepare the capital expenditure budget based on the plant, equipment, motor vehicles and other capital assets required to be purchased (including replacements) in the coming year (see section 4.20).
 - Where capital funds or physical equipment is the limiting factor, the capital expenditure budget may be prepared first, and functional budgets will be based on the capacity of the equipment that will be available, with allowance for downtime.
- (xii) when the functional budgets have been reviewed and their mutual consistency checked, the management accountant will combine them into a master operating budget which is, in effect, the budgeted Profit and Loss account for the coming year. This should include depreciation on existing fixed assets, and proportionate depreciation on assets purchased and sold during the year. The master budget should show an adequate profit, as estimated at the profit planning or outline stage.
- (xiii) the management accountant will prepare budgets for changes in stocks, debtors and creditors (see section 4.21).
- (xiv) the management accountant will then prepare a cash budget which will include:
 - (a) sales revenue per the master budget, less any budgeted increase in debtors,
 - (b) production costs per the master budget, less any increase in creditors, plus any increase in stocks,
 - (c) administration, selling and distribution, and research and development costs, less any increase in creditors, plus any increase in stocks.
 - (d) capital expenditure per the capital expenditure budget, and any cash which will be received on sale or scrapping of assets,
 - (e) tax payments,
 - (f) expected dividend payments (and interest payments unless included in administration costs).
 - (g) any cash to be received by issue of shares, debentures, etc. or to be paid on redemption of debentures or redeemable preference shares,
 - (h) opening balance at bank.

By scheduling receipts and payments by month, and carrying forward the cumulative balance from month to month, it can

be seen whether the company will have sufficient cash not only at the end of the year, but at all times during the year. Plans can then be made to raise any additional funds required, or to invest any temporary surplus. (See sections 4.22 - 4.24).

- (xv) The last statement to be prepared is a Budgeted Balance Sheet, as at the end of the budget period. This is made up from all of the preceding budgets. It has three main purposes:
 - (a) to check the asset structure resulting from the year's operations, e.g. the ratio of fixed assets to current assets, and current assets to current liabilities;
 - (b) to check the capital structure (the proportion of total assets provided by each class of capital);
 - (c) as a double entry check on the master operating budget, capital expenditure budget, and budgets for stocks, debtors, creditors and cash. (The management accountant or whoever assembles the budgets is responsible for their arithmetical accuracy).
- (xvi) the Board of Directors approves the complete budget,
- (xvii) the relevant sections of the master operating budget are distributed to operating levels.

Some of these steps occur together rather than in chronological sequence as implied above. Large firms may take up to six months to complete budget preparation. Network planning may sometimes reduce this lead time. The final distribution of budgets must be before the budget year starts.

The above sequence is represented in the diagram opposite.

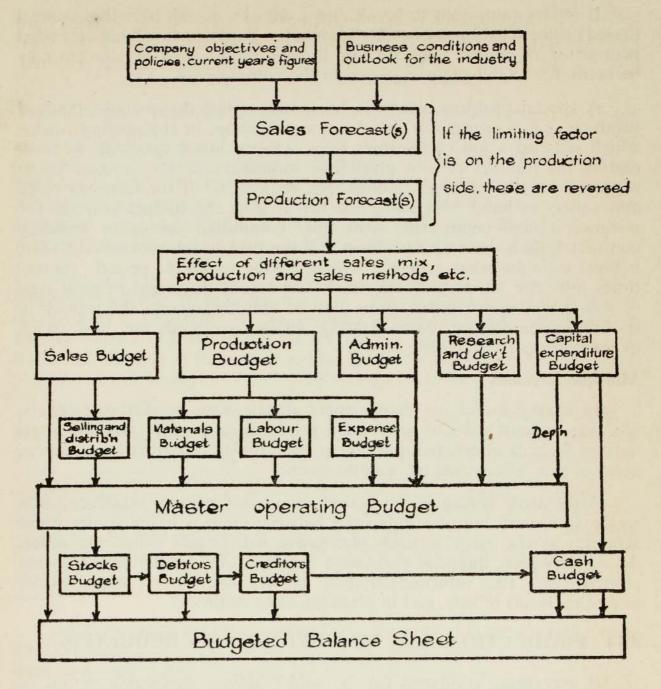
4.13 SALES BUDGETING

If the growth of the firm is limited not so much by production capacity, but by the sales revenue it can achieve, the starting point for budgeting is a sales forecast, based on general business conditions and special conditions affecting the industry of which the firm is a part.

Sales forecasting and market research are now highly sophisticated subjects which draw on statistical techniques and sources. They are not within the scope of this book.

However, a distinction may be drawn between forecasting from the bottom up, and from the top down. A forecast which is an aggregate of the expectations of individual salesmen is said to be compiled from the bottom up. A forecast which is a projection of present trends, taking into account expected future changes, is a forecast "from the top". The latter method will take into account

(i) factors affecting the *size* of the total market such as the growth of the population, disposable incomes, Government tax and credit policy, changes such as urbanisation, and competition from other products.



and (ii) factors affecting the *share* of the total market that the firm will get, such as price, advertising, packaging, growth in retail outlets, sales training, etc. and the price, advertising, etc. of competitors.

This is often very accurate in total, but becomes more inaccurate as it is broken down by product, by sales area, by salesman territory, and by month. Conversely, individual salesmen may have a good idea of what sales they can achieve in the coming year, especially when they can identify the customers, but these are often on the high side (perhaps due to optimism, or perhaps due to desire to shorten delivery dates).

The best method is probably a combination of both. Sources of difference may be found by analysing by product, by area, etc. and these may be investigated and reconciled.

It is very important to break down sales by month (or other control period) since most businesses are seasonal. Experience will indicate what proportion of annual sales are sold in each month, and adjustment may be made for any changes expected in the coming year.

A special problem occurs in businesses which do not sell standard products, e.g. a contractor, or motor repair shop, or engineering works, which sells on a job or contract basis. Every job is different, so forecasting the number of jobs gives little indication of the revenue to be expected (or the materials, labour, etc. required). If the firm has work and orders in hand which will last for at least the budget year (as for instance a civil engineering firm fully committed on major building contracts), then there is no problem. If the firm is not committed so far, it must estimate what orders it will be taking to fill the period. Sometimes jobs can be roughly classified, and trends discerned in each type of job, e.g. a motor repair shop may be able to forecast the growth in its lubrication service, panel beating, engine overhauls etc. and attach average prices to each type of job.

Multiple forecasts

It is very useful for management if salesmen, market researchers, etc. can forecast sales at alternative prices, or any other possible alternatives such as alternative packaging, advertising, distribution channels, areas of sale, after-sales service and so on.

Alternative forecasts of course, have no greater accuracy than single forecasts, but the difference between them is likely to be more accurate as the error in each alternative will largely offset the other. As we have seen, financial evaluation is evaluation of differences between alternatives. This information then, is very relevant in setting prices and other terms of sale, and in planning sales methods.

4.14 PRODUCTION AND FINISHED STOCKS BUDGETING

If everything produced can be sold (within a reasonable period of time), the limiting factor is on the production side, and the production plan will largely determine the sales plan. (Even in such a seller's market it is necessary to plan how sales will be achieved at least cost).

The limiting factor, e.g. machine capacity, will determine maximum production. The possibility of buying in additional product should not be overlooked, since this may be re-sold at a profit. Even if the finished product cannot be purchased outside, it may be possible to sub-contract part of the manufacturing and so increase effective capacity. Every possibility of breaking the limiting factor (bottleneck) should be explored.

If the firm produces two or more products, it will make more profit by concentrating on the product (and production methods) that show the highest contribution (selling price minus variable costs) per unit of limiting factor. If, for instance, product A sells for Rs. 10/-, has a variable unit cost of Rs. 6/- and needs 2 hours of machine time per unit,

while product B sells for Rs. 12/-, has a variable unit cost of Rs. 7/50, and uses 3 hours of machine time per unit, which product is more profitable? A makes $\frac{10-6}{2}$ = Rs. 2/- per machine hour, but B makes only $\frac{12-7/50}{3}$ = Rs. 1/50 per machine hour. Suppose we have only 1200 machine hours. Then production of A alone would contribute Rs. 2,400 to overheads and profit, while production of B alone would contribute only Rs. 1,800. It may not be possible to discontinue B altogether for longer term reasons, but in the short term every hour of machine time used on B rather than A loses Rs. 0/50 profit (Rs. 2 — 1/50). See Appendix 2 on limiting factor analysis and linear programming.

Whether the production forecast or the sales forecast comes first, it will be necessary to plan stock levels. Finished stock is carried where the product is *standard*. If the product is non-standard, production is usually started only on receipt of a customer order. Stocks would not be carried because of the risk of not being able to sell them; this is greater than the risk of losing an order by not being able to meet it immediately.

Where the product is standard, the aim is usually to keep stock at a level that any normal fluctuation in the rate of sales can be met without delay (i.e. without risking loss of orders). However, the risk of losing a few orders must be balanced against the cost of keeping stocks at an unduly high level. The cost of holding stocks includes interest on capital tied up, deterioration, insurance, risk of obsolescence, and stores overheads. These commonly add up to 20% or more, each year, of the cost of the stock being held. In a seller's market of course, the risk of losing sales is relatively slight, and stocks can be correspondingly reduced.

Another major factor influencing the stock level is production costs. The production cost per unit is lower for long production runs, since the set-up and take-down costs (which are fixed for each run) are then divided over a larger output. However, storage room must be found for this output; average stock levels and stock holding costs are higher, and again must be balanced against the potential reduction in production costs. Similarly, if only one product is manufactured, production costs will be lower if production can be maintained at an even rate throughout the year, independently of sales fluctuations; this saving must be balanced against higher stock-holding costs.

Production planning should consider the variety of products offered to customers. Often analysis of sales by product (i.e. each different item produced, including all the small variations in specification or model that enthusiastic salesmen may take orders for) shows that a large number of items accounts for only a small proportion of revenue. These items are also the ones that cost a disproportionate part of the total, since each one needs special materials, or parts, or additional processes, finish, packing, etc. Costs may be significantly reduced by standardising on one or a few basic lines.

A related subject is value analysis, which systematically analyses the functions served by each raw material or component in the finished product, or tool used in its manufacture, with a view to substitute standard materials, components, or tools having no more features and no higher quality than are strictly required. The objective is to reduce cost by standardising, simplifying, and reducing the number of items kept in stock. Similarly, the finished products may be studied with a view to redesigning them for production at lower cost, without prejudicing the attributes actually required by the customer. The production budget will show the output and cost of each product, broken down by month. In a firm having several products total output may also be shown in terms of standard hours. (A standard hour is the amount of output that can be produced in one hour working at standard rate).

4.15 MATERIALS, LABOUR AND PRODUCTION OVERHEAD BUDGETING

Where production is non-standard and each job is different, the materials, labour, machine time and other resources required can only be roughly estimated from the forecast revenue, using past figures for average material content, labour content, etc. The main object is to ensure a sufficient supply of the essential materials or other resources that might prevent the acceptance of orders, but on the other hand, not to order more than will be used. If it is possible to sub-contract work, or if the amount of labour can be expanded to meet important orders by working overtime, this will allow more flexible working.

Where production is standard, budgets will be made for direct materials, for direct labour, and for production overhead.

(i) Direct materials (raw materials, components, and consumables directly attributable to the product) are estimated for each product from a Materials Specification (Design Department). This shows the quantity of each material required for one unit of product. The process charts (Production Control) show at what stage of manufacture each material is required; if the production cycle is long it will be necessary to calculate how much of each material will be necessary each week of the cycle so as to ensure finished production in the week required by the sales (or stocks) budget. Allowance should be made for reasonable material losses (if material standards exist these should be used – see section 4.16).

Adequate provision should be made for stocks of materials to allow for variations in the rate of production, and possible delays in ordering replenishments.

If stocks can be ordered in small quantities for frequent deliveries, this may reduce the average stock level and save stock holding costs, but this must be balanced against the higher administrative cost of frequent orders and deliveries, and the risk of delivery failures holding up production (see section 6.12 on inventory control).

For each material the quantity required is phased throughout the year (programmed) and multiplied by the prices expected by Purchasing Department. If quantity discounts are available it may be economic to buy larger quantities at longer intervals and incur higher stock-holding costs.

Sometimes indirect materials are estimated and included in a comprehensive Materials Budget (rather than be left in Production Overheads). Sometimes capital equipment, and outside services, such as printing, cleaning, security and building maintenance are also included, making a total Purchasing Budget.

(ii) Direct labour is estimated for each product from process charts showing the grade of labour and time required for each operation. Unit times required, including allowance for idle time, are multiplied by daily output required, and divided by the number of working hours in the day to get the number of each grade of personnel required. (If standard times have been calculated these provide a basis for budgeting).

These requirements will be programmed by week or month, and compared with existing strength and expected wastage. This provides a basis for recruitment, which must naturally be planned in advance to allow time for advertising, selection and training. (The same work is done for all personnel, including indirect personnel in production, administration, selling and distribution, and may be combined in a total Personnel Plan).

The cost of direct labour will depend upon the system of payment. In theory, a piecework system makes budgeting very simple since one merely multiplies the required output by the rate per piece, and it is not even necessary to calculate how many operators will be required. In practice, straight piece-work is seldom used; usually time rate applies as a minimum so that the slow worker gets at least a minimum wage. It is necessary to examine the existing wage agreements and procedures closely and to ascertain from Personnel Department what changes are likely in the coming year, so that numbers of each grade of labour can be translated into rupees.

(iii) Production overhead includes all factory expenses which cannot be directly attributed to individual products (see Appendix 1). These should be considered individually, and estimated in relation to the rest of the production plan. Some expenses such as materials handling may be found to vary according to the weight (or even value) of direct materials, so can be estimated from the materials budget. Other expenses such as supervision will depend on the numbers of direct labour.

Each expense should be estimated by the person who in fact authorises it, e.g. insurance should be estimated by the accountant if it is he who arranges insurance; overtime should be estimated by the production manager or department supervisors, whoever authorises overtime, etc.

It is useful both for planning and control to distinguish expenses which vary with the volume of output from those that remain fixed within a certain range (see flexible budgets section 4.26)

4.16 STANDARD COSTS

Where a firm has standard products manufactured by standard processes, it is possible to estimate in detail the necessary materials, labour and other inputs for one unit of each product. A standard cost is a pre-determined (or pre-estimated) unit cost, which is calculated from management's standards of efficient operation and standard prices of inputs.

Standard costs are used for budgeting, and for subsequent control of operations by variance analysis (see Section 6 Appendix 1). They are also used as a guide in fixing prices.

No standard cost will remain useful as a basis of control for ever, since production methods change, and also prices of materials, labour, etc. A basic standard is one that is not revised over a long period in order to show cost trends. For control purposes, a current standard is used and is usually revised once a year.

A current standard should represent reasonably attainable efficiency, and expected prices, over the year to which it applies. It should allow for reasonable wastage of materials, hold-ups in supply, break-down of machines, lack of sales demand, etc.

The standard unit cost of a product is built up on a standard cost card as follows:

- (i) the quantity and type of each material and component required for one unit of product will be shown on a Materials Specification, prepared by the Design department at the time the product was developed. Reasonable allowance should be added for stores losses, scrap and other material losses. Each material quantity should be multiplied by its expected price, provided by the Purchasing department. The sum of these is the standard materials cost;
- (ii) the hours required of each grade of direct labour, including normal idle time due to absence of materials, absence of tools, machine breakdown, operator absence, and absence of demand, will be determined by work study (Industrial Engineering department). These hours are multiplied by expected wage rates according to Personnel department, to give the standard labour cost;

(iii) each production overhead expense will be estimated for the year from reasonably expected quantities and prices, and the total divided by the expected production in units to give the standard production overhead cost per unit.

If several products are made on the same facilities it will be necessary to apportion overhead to products on a suitable basis such as labour hours or machine hours. The overhead absorption rate for a current (one year) standard should be based on the hours actually expected for the forthcoming year, excluding idle capacity due to repairs, strikes, etc. and any excess capacity due to shortage of sales.

Example: An automated bottle factory charges production overhead to products at Rs. 3/- per machine hour. The operation sheet for milk bottles shows that one bottle uses the machine for 1 minute. Therefore the standard overhead unit cost will be Rs. $3/- \div 60 = 5$ cents.

(iv) administration, selling and distribution expenses are sometimes also brought within the standard cost calculation. They are estimated similarly, and divided by expected production.

The total of (i) to (iv) is the standard unit cost.

4.17 SELLING AND DISTRIBUTION COSTS BUDGET

This is prepared by the sales manager or his staff at the same time as the sales budget, with which it must be closely co-ordinated.

One of the difficulties of budgeting selling costs is that of determining their relationship with sales. Most selling costs precede the sale itself, while most distribution costs follow the sale. This time difference means that even variable costs cannot always be expected to relate to the sales in the same year.

Salesmen's commission and bonuses, royalty on sales and aftersales service are variable costs which can be budgeted by reference to the appropriate sales, whether of the current year or from a previous period.

In theory, fixed selling costs should only be incurred where the cost is less than the contribution from the extra sales generated. In practice, it is very difficult to say what extra sales would be generated by, say, an extra salesman, or an extra Rs. 10,000 of advertising, though the managing director must form some opinion. Commonly, the advertising appropriation is fixed at a certain percentage of sales, comparable with the rest of the industry. A seller of consumer goods or services might spend anything from 1% to 10% of sales revenue or more on advertising, depending on the degree of competition and the rate of change of demand, e.g. fashionable goods require heavier advertising. A seller of intermediate or industrial goods would spend far less.

4.18 ADMINISTRATION COSTS BUDGET

This is usually prepared by the respective departmental managers (Accounts, Purchasing, Secretary, Personnel, etc.) and reviewed by the

Chief Accountant or Controller. Each expense will be budgeted having regard to past levels and expected future changes.

Most administration costs are relatively fixed for small changes in output, though some such as travelling expenses, telephone and stationery may be semi-variable.

This is certainly a budget in which Parkinson's Law operates, viz. that work expands to fill the time available for its completion. Work study should be used to cut down unnecessary work, duplication of effort, and excessive paperwork. The budget is an occasion for reviewing the results of past efforts.

4.19 RESEARCH AND DEVELOPMENT COSTS BUDGET

Most firms do not have the resources to finance large scale R & D projects especially since the risk level demands large numbers of such projects to ensure that the successes pay for the failures. There are various alternatives:

- (i) collaboration with universities and Government and private research institutions,
- (ii) centralised research for each industry by a trade association, supported by firms in proportion to their size.
- (iii) licensing and franchise agreements by which the firm obtains the right to manufacture and sell a patented product and (often) technical know-how on manufacture and marketing, for which it pays a royalty, based usually on the product sales,
- (iv) joint ventures e.g. with foreign firms, which provide the right to use patents, technical know-how, managerial assistance, and equity participation in the form of foreign exchange or necessary plant and equipment, in return for a share of profits,
- (v) plant construction contracts, including know-how on the operation of the plant.
- R & D expenditure can be classified as follows:-
 - (i) pure or basic research (in the UK this represents only about 6% of the total)
- (ii) applied research on new product development (37%)
- (iii) applied research on product improvement and cost reduction (41%)
- (iv) technical services to other functions such as engineering, maintenance and quality control (16%).

Where R & D is small, it is included in the production overhead budget. All R & D costs are fixed since they are not related to current levels of production.

4.20 CAPITAL BUDGETING

The capital budget or capital expenditure budget, is a list of projects involving capital expenditure that the management believes to be worthwhile and for which sufficient capital funds are (or will be) available. The capital cost of each project should be shown for each year, going ahead three to five or even more years, and the capital cost for the budget year is further analysed by quarter or by month. It should be emphasised that the capital costs for the budget year are included as assumptions in the various operating budgets.

All capital projects should be fully evaluated before the firm commits itself, to ensure that they meet the technical, commercial, marketing, personnel and financial objectives of the firm. The financial evaluation, for instance, should ensure that projects meet the required profitability standards, as measured by discounted cash flow, and do not involve excessive risks or illiquidity. Where it is not possible to evaluate the benefits of an investment e.g. a new office building, the financial evaluation is still made but this is necessarily limited to a consideration of costs, risks and alternatives. However, projects may be included in the budget which have not at that stage been fully evaluated and approved. They are included because, on a rough screening, they appear worthwhile and it is wise to provide finance for them. Nevertheless, this need not constitute authorisation; a later evaluation may show the project in a different light, or some alternative may become preferable.

Some capital proposals originate with the various functional areas of management, and some with top management. For instance, the Production Manager will put up requests for plant and machinery, both new and replacement machines, also factory and stores buildings, vehicles, materials handling equipment, factory roads, car parks, welfare facilities such as canteens, sports grounds, &c. and furniture and equipment for factory offices. The Sales Manager will put up requests for new and replacement vans and lorries for distribution, showrooms, warehouses, and furniture and equipment for sales offices. The administration manager will request office cars, buildings, furniture, equipment, &c. There may also be outside investments e.g. trade investments.

Proposals may originate at any time during the year, but at budget preparation time all departments are requested to estimate their capital needs for the coming year. Therefore the capital budget for a particular year will include expenditure on continuing projects which have been authorised in the past, expenditure on new authorised projects, expenditure on projects which have not yet been fully evaluated or authorised but have been screened and approved in principle by top management. Also there will be included block provisions for miscellaneous small items which it is not worth forecasting in detail.

4.21 WORKING CAPITAL BUDGETING

Working capital means current assets per the Balance Sheet (mainly stocks of raw materials, work in progress, and finished goods, and debtors

and cash) less current liabilities per the Balance Sheet (mainly creditors). Working capital is sometimes taken as roughly proportional to sales. A more accurate estimate is based on a calculation of each current asset and liability in turn:

(i) Stocks of raw materials:

The value of raw materials on hand depends on the *period* between receipt and issue to production, and on the *rate of usage*. (This ignores the fact that materials are not delivered in a continuous flow in the same way as they are issued, but nevertheless it is a convenient approximation).

Suppose a firm assembles bicycles. On average, wheels are purchased and lie in stock for 3 months before they are used (as a buffer against delivery delays). The rate of production of bicycles is 1,000/month so the rate of usage of wheels is 2,000/month. Wheels cost Rs. 20/- each. Then the value of wheels in stock would be 3 months x 2,000/month x Rs. 20 = Rs. 120,000.

(ii) Work in Progress

This has to be calculated for each element of cost in turn. The raw materials element will depend on the period between issue from stock and the completion of the finished product, and on the rate of usage over this period. Suppose a ton of cement requires 0.6 ton of limestone @ Rs. 50/- a ton, that the production cycle takes 3 days and that cement is produced at 100 tons/day. The limestone component in cement work in progress would then be 3 days x (0.6 x 100) tons/day x Rs. 50=Rs. 9,000.

In assembly-type production, not all materials are required at the start of production. A more refined estimate would take each material in turn for the period from the time it is required up to the completion of the finished product, multiplying by rates of usage as before.

The direct labour element is added to work in progress during the production cycle. At any moment in time, some work will have just been started and some work will be almost finished, but the average item will be half-complete as regards labour. This assumes that labour is added to the work in progress at an even rate throughout the production cycle. Therefore, the labour component is *half* the production period, multiplied by the rate of usage. In the above cement works, if direct labour costs Rs. 10 per ton of cement, the labour component in work in progress would be $\frac{1}{2} \times 3$ days $\times 100 \times 100 \times 100$ tons/day $\times 100 \times 100 \times 100$ Rs. 1,500.

The last element is overhead. This is usually deemed to be spent evenly over the production period in the same way as labour. If overhead is Rs. 15 per ton of cement, it would account for $\frac{1}{2}$ x 3 days x 100 tons/day x Rs. 15 = Rs. 2,250 of the cost of work in progress.

Total cost of work in progress above = Rs. 9,000 + 1,500 + 2,250 = Rs. 12,750,

(iii) Finished Goods

The cost of finished goods on hand depends on the period between the completion of production and eventual sale (i.e. the average residence time that stock lies in store) multiplied by the rate of sale over this period. For simplicity, it may be assumed that the rate of production is equal to the rate of sale. Finished goods are usually valued at full cost, including overhead.

Suppose a canning factory has the following cost structure for canned mangoes;

		per case	of tins:
Direct materials -	fruit	Rs 14.50	Rs.
	tins	8.00	22.50
Direct labour		helyni, Jeniselija	7.50
Overhead-variable		Hall to Live in	2.00
fixed			8.00
tai des sants ai mais			40.00
Selling price		the second	50.00
Net profit		AND AND THE PARTY OF THE PARTY	10.00

It budgets to produce and sell 1,000 cases/month. The average period that cases lie in stock is 1½ months. The average value of stock in hand is therefore 1½ months x 1,000 cases/month x Rs. 40/- case = Rs. 60,000.

(iv) Debtors

This depends on the average collection period (i.e. the period between invoicing and receipt of cash) multiplied by the rate of invoicing. In the above example, suppose that the average collection period is 2 months. Then debtors in the balance sheet would be 2 months x 1,000 cases/month x Rs. 50/- case = Rs. 100,000. (Note that this includes the profit element while all the previous items have been valued at cost. See section 4.22). (v) Cash

The larger the volume of business, the larger the buffer cash balance that must be kept. However there is no precise formula to determine the cash level. If a firm has operated safely on an average cash balance that represents, say, 2 weeks' purchases, then it may use this relationship to budget cash requirements at a different level of working. In the above example, 2 weeks' purchases would be estimated as $\frac{1}{2}$ month x 1,000 cases/month x Rs. $\frac{40}{case} = Rs. \frac{20,000}{cash}$ required.

(vi) Creditors

Creditors for materials supplied depend on the average payment period, and the rate of purchase of materials. Suppose that the cannery above settles its bills for fruit and tins 1½ months after receipt, i.e. this

is the average payment period. Then creditors for materials would be 1½ months x 1,000 cases/month x Rs. 22.50 per case = Rs. 33,750.

There may also be creditors or accruals for labour and overhead. Suppose that the average hour of labour is accrued for $\frac{1}{2}$ month, then the wage accrual will be $\frac{1}{2}$ month x 1,000 cases/month x Rs. 7.50 per case = Rs. 3,750. Suppose that overhead expenses are paid like materials, on the average, $1\frac{1}{2}$ months after accrual. An exception is depreciation, which is not a creditor. Other overheads amount (say) to Rs. 5 per case. Therefore, the overhead creditor will be $1\frac{1}{2}$ months x 1,000 cases/month x Rs. 5 per case = Rs. 7,500.

Total creditors will be 33,750 + 3,750 + 7,500 = Rs. 45,000

4.22 BUDGETING CASH REQUIRED FOR WORKING CAPITAL

The working capital required is not the same as cash required, since working capital includes profit and depreciation elements. In effect the latter are internally financed; external finance is required only for the balance of working capital. An example will make this clear.

Suppose, in our cannery example, that fixed overhead includes Rs. 5 of depreciation per case of tins, i.e. depreciation is charged into production at the rate of Rs. 5,000 per month. Let the production/sale cycle and payments/receipts cycle be as follows:

1 month

D --- wastawiala in staals

	Raw materials in stock							ontn	
	Production cycle					$\frac{1}{2}$	mo	onth	
	Finished goods in stock					$1\frac{1}{2}$	mo	onths	
	Average collection period				***	. 2	mo	onths	
	Average payment period (materi	als an	d cash	10	verhead				
	expenses)					. 11	mo	onths	
	Average payment period (wages))			•			onth	
	Working capital according to t	the ab	ove fo	rm	ıula woı	ıld be	as	follow	s:
	Working Cupitur according to							Rs.	
	Stock of Raw Materials =	1 X	1000	X	22.50			11,25	50
	Work in progress - materials=				22.50	11,2	50		
	- labour =	200			7.50	1,8			
	- overhead=					2,50		15,62	25
	Stock of finished goods	1 x	1000	X	40.00			60,00	00
	Debtors	2 x	1000	X	50.00			100,00	00
	Cash – ignore								
								186,87	75
r	ess: Creditors - materials	11 x	1000	x	22.50	33,7	50		
_	- labour	1 x	1000	X	7.50	3.7			
	- overhead				5.00+			45,00	00
	Total working capital, per	12 11	1000	-				-	
	balance sheet							141,8	75
	*Half the production cycle					-			

⁺ This does not include depreciation which normally does not enter creditors. 1½ months is the average payment period of all other overhead expenses.

Out of the above, cash has to be provided to pay for materials, wages, and cash overhead expenses, but not for depreciation or profit elements. Depreciation is included in work in progress, finished goods stock and debtors. Profit is included only in debtors. These elements are excluded as follows:

iı	W.I.P. overheads in finished goods in debtors	:	15	X	1000	X	5.00 5.00 5.00	1,250 7,500 10,000
								18,750
(ii) Profit in debtor	rs		2	X	1000	x	10.00	20,000
Therefore cash	required = 141,875	5 – 18,7	50	- 2	20,000)	Rs.	103,125

4.23 VARIATIONS IN WORKING CAPITAL

Working capital will change if any of the following factors change:

(i) The rate of production and sale. If the cannery steps up to 1,500 cases/month, all *variable* costs will increase proportionately. Fixed costs of course remain fixed. Overheads must therefore be split between fixed and variable so that the new level of working capital can be calculated:

Stock of raw materials :	$\frac{1}{2}$	X	1,500 x 22.50		Rs. 16,875	
Work in progress- Materials Labour Variable overhead Fixed overhead	-	X X X	1,500 x 7.50 1,500 x 2.00	16,875 2,812 750	22.427	
Stock of finished goods-			Rs. 8,000/month	2,000	22,437	
Variable costs Fixed costs			1,500 x 32.00 Rs. 8,000/month		84,000	
Debtors Cash – ignore	2	x	1,500 x 50.00*		150,000	
					273,312	
Less Creditors— Materials Labour Variable overhead Fixed overhead	$1\frac{1}{2}$	X X		50,625 5,625 4,500 4,500	65,250	
Total working capital, per balance sheet						

^{*}The selling price is still Rs. 50; though the fixed costs per unit have gone down, the profit per unit has gone up.

Because of the influence of fixed costs, working capital does not increase proportionately with the volume of production.

(It might also be argued that even variable costs should not increase proportionately. For instance, it may be possible to bulk purchase raw materials at less than Rs. 22.50. Also, stock quantities should not increase proportionately – see section 6.12 on inventory control. These are all economies of scale).

- N. B. If the rates of production and sale are not equal, i.e. stock is being built up or run down, the appropriate assets and liabilities should be varied.
- (ii) The production/sale cycle. If the average period from receipt of raw materials to issue to production can be shortened (i.e. faster turnover) the stock of raw materials is proportionately reduced.

If the production cycle (i.e. from issue of materials to receipt of finished goods in stock) can be reduced, work in progress is proportionately reduced.

Note that if an extra shift is worked this has two effects: (a) the rate of production per month is increased, and (b) the production cycle is reduced. Strictly speaking, the production cycle is reduced only when it depends on the number of hours worked, not on the hours elapsed; seasoning timber, for instance, could not be speeded up in this way.

These two effects cancel out leaving work in progress unchanged except for the fixed overhead element. The higher the fixed costs the more economic it becomes to run an extra shift.

Similarly, stock of finished goods may be reduced by selling them sooner after completion.

- (iii) The average collection period and average payment period. If the former can be reduced (preferably without spoiling customer goodwill or giving expensive discounts) debtors are proportionately reduced. If the latter can be increased (preferably without spoiling goodwill or losing valuable discounts) creditors are proportionately increased.
- (iv) Unit variable costs, monthly fixed costs, and selling price. It will be apparent from the formulae and from common sense that if costs go up, the working capital requirement will also be higher. Paradoxically, if the selling price is raised, this also increases the working capital required, since debtors will be increased. However, an increase in profit is internally financed; cash is required only for any increase in costs.

4.24 CASH BUDGETING

The purpose of ordinary commercial or accrual budgeting and accounting is to find out the annual profit, by matching costs against revenues.

Cash budgeting and accounting includes only receipts and payments (cash flows), and its object is to ensure a balance between liquidity and profitability.

The finance manager aims to minimise the level of cash without at the same time running the risk of not being able to pay bills as they become due. Cash is minimised because by itself it is unproductive. Other assets are employed to earn profits, but cash is idle; the effect of a large cash balance is to reduce the overall rate of return on assets. If excessive cash balances cannot be productively invested in the business so as to earn the sort of return expected by the shareholder-owners, they should be returned to the shareholders, e.g. by dividend or bonus. On the other hand, sufficient cash must always be available to meet current needs and contingencies.

Extra cash is sometimes retained to take advantage of special opportunities that may arise, but this is not always necessary; if a standby line of credit can be arranged with an outside financial institution, the The cash budget reconciles assets need not be inflated with idle cash. the objective of continuous solvency (ability to pay creditors as they become due) with the objective of profitability (return on net assets). Without a cash budget, management might unexpectedly be financially embarrassed e.g. due to overtrading, and be forced to delay paying creditors (which loses discounts receivable and reduces the firm's credit rating) or try to borrow additional funds (which is best negotiated at a time of strength). Conversely, a large bank balance may build up, thus inflating net assets and reducing overall return on capital. A cash budget provides in advance for additional funds required, short term or long term, and for profitable investment of excess cash, (e.g. short term surpluses may be invested temporarily in liquid securities).

Another advantage of cash budgeting is that depreciation funds can be profitably invested in the business instead of in outside securities at low rates of interest; the budget ensures that cash will be available for planned replacements.

There are two methods of preparing a cash budget. The receipts and payments method sets out the opening cash balance, adds budgeted receipts, and subtracts budgeted payments, (based on all other budgets) as follows:

- (i) receipts will be taken from revenue per the sales budget, minus any increase in debtors per the debtors budget (or plus any decrease, as the case may be);
- (ii) operating payments will be taken from expenditure per the Production, Administration, Research and Development, and Selling and Distribution Budgets, plus any increase in stocks per the Stocks Budget, minus any increase in creditors per the Creditors Budget (and vice versa);
- (iii) capital payments will be taken from the Capital Expenditure Budget, adjusted for any capital creditors;

- (iv) capital receipts on sales of assets should also be scheduled;
- (v) tax payments on the due dates;
- (vi) dividend payments, according to policy;
- (vii) any receipts or payments on issues of new capital or redemption of debentures or preference shares, as planned;
- (viii) opening balance at bank.

The above budget would usually be prepared by the management accountant after the functional budgets are prepared and approved. (If cash is the principal budget factor, the capital expenditure budget will usually be prepared first, and sized so that the final cash budget remains within the given limits).

The funds flow method of cash budgeting is to substitute net profit, depreciation, and working capital increases or decreases, for items (i) and (ii) above. Items (iii) to (viii) would appear the same as before.

It can be seen that this will provide the same answer as the receipts and payments method since net profit plus depreciation equals revenue minus operating costs paid in cash, and the working capital change is equal to the net sum of changes to debtors, stocks and creditors. However, the working capital change is not instantaneous. If a cash budget is being prepared for a short term period such as a year it is still necessary to show how the working capital increases each month. The easiest and safest way of doing this is, in effect, to return to the receipts and payments method (see example below). The funds flow method is therefore used more for long term cash budgeting.

The expression "cash flow" is often used especially by financial journalists to mean net profit with depreciation added back. This usage is not recommended as it ignores working capital and other cash items. Also it leads company directors into thinking that they can increase the cash flow by charging more depreciation; naturally, if depreciation is increased, net profit is decreased, and the cash flow from these items remains the same.

Example. Show the cash budget for the year, broken down into half-month periods, and the balance sheet at the end of each half month for the cannery in section 4.22 assuming that it starts business on 1st January (i.e. it starts receiving materials on 1st January, and production and overheads start on 16th January). Ignore fixed assets, share capital and tax. Working capital is to be financed by overdraft (other than the profit and depreciation element). See answer opposite.

4.25 FUNDS FLOW STATEMENTS

Many firms complete their budgeting by preparing a funds flow statement for the forthcoming year. This is a classified list of differences between the balance sheet at the beginning of the year and the balance sheet at the end of the year. (The Profit and Loss account shows only differences on revenue account).

CASH BUDGET

	2000	500,		2222	75	000	88	00	75	500	75
16-31 May	$^{-11,250}_{-3,750}$ $^{-2,500}_{+25,000}$	+7,500		11,250 15,625 60,000 100,000	186,875	33,750	7,5(45,000	141,875	25,000 21,250 95,625	141,875
1–15 <i>May</i>	-11,250 -3,750 -2,500	-17,500 -103,125		11,250 15,625 60,000 100,000	186,875	33,750	7,500	45,000	141,875*	20,000 18,750 103,125	141,875
16-30 April	-11,250 -3,750 -2,500	-17,500 -17,500 -85,625 -103,125		11,250 15,625 60,000 75,000	161,875	33,750	7,500	45,000	91,875 116,875	15,000 16,250 85,625	91,875 116,875 141,875
1-16 April	-11,250 -3,750 -2,500	-17,500 -68,125	MONTH overdraft	11,250 15,625 60,000 50,000	136,875	33,750	7,500	45,000	91,875	10,000 13,750 68,125	91,875
16-31 March	-11,250 -3,750 -2,500	-17,500 -17,500 -50,625 -68,125	BALANCE SHEET AT END OF EACH HALF MONTH (assuming cash deficit above is financed by bank overdraft)	11,250 15,625 60,000 25,000	111,875	33,750	7,500	45,000	66,875	5,000 11,250 50,625	66,875
1–15 <i>March</i>	-11,250 -3,750 -1,250	-16,250 -33,125	OF EACH financed	11,250 15,625 60,000	86,875	33,750	7,500	45,000	41,875	8,750 33,125	41,875
16–28 Feb.	-11,250 -3,750 -	-1,875 -15,000 -1,875 -16,875	AT END above is	11,250 15,625 40,000	66,875	33,750	6,250	43,750	23,125	6,250 16,875	23,125
1–15 Feb.	-1,875	$\frac{-1,875}{-1,875}$	HEET / h deficit	11,250 15,625 20,000	46,875	33,750	3,750	41,250	5,625	3,750	5,625
16–31 Jan.	1111		ANCE S ming cas	11,250 15,625	26,875	22,500		25,625 41,250	1,250	1,250	1,250
1–15 Jan.	1111		BAI (assu	11,250	11,250	11,250	1	11,250	1	111	
	:::	::		::::		:	: :		:		
	Payments – Materials Labour Cash overhead Receipts from Sales	Net Cash Flow Cumulative Flow		Stock of raw materials Work in progress Finished Goods Debtors		Less: Creditors- Materials Wages	Cash overheads		Net Assets (All working capital)	Financed by: Retained Profit Depreciation Overdraft	Capital employed

The *Working capital reaches Rs. 141,875 per the calculation in section 4.22 after 4½ months, and then remains steady. maximum overdraft requirement is Rs. 103,125. This peak also occurs after 4½ months, but then declines as profit depreciation provisions are retained. The purpose of the funds flow statement (also called source and disposition of funds, or source and application of funds) is to show the sources of funds during the year and the uses to which they will be put. (A similar statement is made at the end of the year to show actual sources and uses).

Sources of funds are:

- (i) Capital issues
 (ii) Long term loans

 External sources

 (iii) Profit, net of tax
 (iv) Depreciation retentions

 Internal sources

 Uses of funds are:

 (v) Dividends (paid and payable)

 (vi) Papayment of assistable.
 - (vi) Repayment of capital External uses
 (vii) Repayment of loans
 - (viii) Investment in fixed assets
 (net of sales of fixed assets)
 (ix) Investment in working capital

 Internal uses

(x) Losses

Total sources must equal total uses (if the opening and closing balance sheets do balance). Note that sources and uses are calculated on an accrual basis, not a cash basis. Profit is taken net of tax charged in the profit and loss account, not tax paid. Dividends are those charged in the appropriation account, not dividends paid.

Preparation of Funds Flow Statement:

- (i) "capital issues" is the difference between paid up capital at the beginning and end of the year. This may be split between different classes of capital. Issue expenses and discount on issue may be deducted inset, or shown as a use. A bonus issue is merely the capitalisation of a reserve and should be excluded.
- (ii) increase in long term liabilities should be sub-divided according to source, e.g. debentures, and reserve for future tax (the latter is legally a reserve but a long term liability from an accounting point of view).
- (iii) profit is usually taken after the tax charge, per the profit and loss account. Any profit or loss on disposal of assets should be excluded (see (viii) below).

Alternatively, profit before tax may be taken as a source and the tax charge to Profit and Loss account counted as a use.

Sometimes undistributed profit is appropriated to various reserves, e.g. reserve for increased cost of replacing fixed assets. In this case, profit may be sub-divided:

- increase in reserve for increased replacement costs
- increase in any other specific reserve, capital or revenue
- increase in general reserve
- increase in balance carried forward in Profit and Loss account.

Capital profits arise either on sale of a fixed asset at a profit, or on revaluation without sale. In the former case, the profit is a "source" of funds, but is better treated as part of the total proceeds of sale which is offset against investment in fixed assets (see item (viii)). Unrealised capital profits do not affect working capital and are neither source nor use. However, they are often included on both sides for greater informativeness.

- (iv) depreciation retention is depreciation as charged in the profit and loss account before ascertaining the profit for the year (irrespective of the change in the balance sheet figures which may be after disposal of assets).
- (v) dividends debited in the appropriation account are a use of funds. If profit is taken net of income tax other than dividend tax, the gross dividends should be taken as a use. This may be split inset between net dividend and dividend tax.
- (vi) any redemption of preference shares is a use.
- (vii) any repayment of debentures or reduction in long term liabilities (such as the reserve for future tax) is a use.
- (viii) investment in fixed assets is the cost of assets purchased during the year. To get this from the opening and closing Balance Sheets, the cost of any assets disposed of during the year must be added back to the difference (and any increase by revaluation excluded).

Sales of fixed assets should be shown at their realised sale or scrap value, and deducted inset from new investment. [This is better treatment than showing sales at written down values (cost less accumulated depreciation) as a source, and any loss on disposal as a use, or profit as a source, since the written down value is no longer relevant].

(ix) the increase or decrease in working capital is the difference between opening and closing current assets less current liabilities. This may be broken down into its constituent items such as stocks, debtors, cash, and creditors.

Where a firm works on an overdraft which is regularly renewed and regarded as a permanent source of finance, this may be extracted from working capital and included under long term liabilities. (x) any net loss for the year would be a use of funds.

The form of the funds flow statement varies. Sometimes the balance sheet form is used, with sources totalled on the left hand side and uses totalled on the right hand side. However the funds flow statement is not an account, nor a statement of balances and is perhaps better shown in vertical form, listing and totalling first sources, then uses.

A common form is to start with opening working capital, add sources (i) to (iv), then deduct uses (v) to (viii) and (x) resulting in closing working capital.

Example: The balance sheets for Eezicum Eezigo Ltd. for the last two years are as follows:

	End year 1	End year 2		End year 1	End year 2
Share capital Ordinary	100	100	Fixed assets	200	220
- Preference	25	-	less accum. depr.	100	103
Capital redemption reserve fund Profit and loss	_	25	Stock	100 45	31
account	15	5	Debtors	15	12
Debentures Current liabilities	30 10	30 8	Cash	20	8
	180	168		180	168

The profit and loss appropriation account for year 2 shows that net profit after tax was 25. This is after charging 18 depreciation, and includes a profit of 5 on disposal of a fixed asset, which had cost 20 and had a written down value of 5 at the time of disposal. The recommended dividend for year 2 is 10. Prepare a funds flow statement.

Flow of Funds in year 2

Sources	Net profit after tax			20	
	Depreciation retained			18	
	Reduction in working capital			27	65
Uses	Dividend	and or .		10	
	Repayment of preference capital			25	
	Investment in fixed assets		40		
	less sale of fixed asset		10	30	65
Uses	Dividend Repayment of preference capital Investment in fixed assets			27 10 25 30	65

- Note (1) The profit on asset disposal is included in the sale proceeds, not in net profit.
 - (2) The depreciation is as charged in the profit and loss account (which equals the increase of 3 in the balance sheet, plus 15 debited on disposal of the asset).
 - (3) Similarly the investment in fixed assets is taken gross of the asset disposed of.

- (4) Working capital declines from 70 to 43 so in this case is a source of funds.
- (5) The changes in the reserves are due to the retained profits which have already been included.

There is another form of funds flow statement which is often called a cash flow statement as it starts with opening cash and bank balance, adds sources (which include any increase in short term creditors) and deducts uses (including any increases in stocks and debtors), resulting in the closing cash and bank balance. If the firm is running on an overdraft, sources are deducted and uses added. This is very similar to the funds flow method of cash budgeting (see section 4.24).

Sources and uses are still calculated on an accrual basis but dividends and tax paid may be substituted for dividends and tax charged. If a payment is substituted for a charge, the opening and closing creditor must be omitted in calculating the change in creditors. For instance, if the dividend charged is 10, but the dividend paid is last year's dividend of 8, the opening creditor is 8 and the closing creditor 10. On the accrual system, this appears as a source of 2 (increase in short term creditors) and use of 10 (dividend charged). On a cash system, it appears merely as a use of 8 (dividend paid).

Example

The summarised accounts for Kandy Chemicals Ltd. for the year to 30th June 1970 are as follows:

Balance Sheet as at 30th June 1970 Fixed assets 1969 1970 1969 1970 Share Capital Rs. Rs. Rs. Rs. 30,000 Ordinary 30,000 20,000 Preference 20,000 40,000 Land and 48,000 Capital reserve buildings 5,000 Replacement of 7,500 52,000 Plant and 54,000 fixed assets Equipment Revenue reserves 92,000 102,000 26,000 less deprecia-24,000 10,000 General 14.000 tion 600 Profit and loss 700 66,000 78,000 account Sinking fund Investments Long term Liabi-26,000 24,000 lities 8,000 10,000 Debentures Current 5,700 Future tax reserve 6.000 asets Current liabilities 15,400 Stocks 16,800 18,100 Debtors 12,400 24,000 Bank overdraft 21,000 300 Cash in hand 500 12,000 Trade creditors 13,800 5,500 Tax 5,700 3,000 Dividends (gross) 5,000 125,800 131,700 125,800 131,700

7,200 Depreciation 7,000	
5,000 Directors' emoluments 5,000	
800 Debenture interest 800	
Loss on disposal of plant 1,000	
1,200 Add: Income on investments 1,300	
11,300 Net profit for the year before tax 17,600	
5,700 Less: Taxation based on profit for the year 6,000	
5,600 Net profit for the year after tax 11,600	
500 Add: balance brought forward 600	
6,100 Available for distribution 12,200	
2,500 Less: Transfer to reserve for fixed asset 2,500	
replacement	
Transfer to general reserve 4,000	
1,700 Preference dividend 8½ % 1,700	
(inclusive of dividend tax) Ordinary dividend 11 % (ditto) 3,300 11,500	
70()	
Balance carried forward Rs. 700	
The disposal of plant account is as follows:	
Cost 10,000 Accumulated depreciation 9,000	
Profit and loss account-loss 1,000	
Prepare a cash flow statement for the year to 30th June 1970.	
Rs. Rs. Rs.	
Opening overdraft less cash in hand 23,700)
Add: uses of funds	
Tax paid 5,500	
Dividends paid (incl. dividend tax) 3,000	
Debentures redeemed 2,000	
Investment in fixed assets 20,000	
less sale of investments $\frac{2,000}{1,400}$	
Investment in stocks 1,400 29,900	
53,600	1
Deduct: sources of funds:	
Profit before tax 18,600 Depreciation retained 7,000	
Depreciation retained 7,000 Reduction in debtors 5,700	
Increase in trade creditors 1,800 33,100)
Closing overdraft less cash in hand 20,500	
Note (1) The profit is taken before deducting the loss on disposal of plant.	

Note (1) The profit is taken before deducting the loss on disposal of plant.

(2) Tax paid, rather than tax charged, is shown as a use of funds. Therefore, the increase in the tax creditor from 11,200 (5,700 + 5,500) to 11,700 (6,000 + 5,700) is not counted as a source.

- (3) Similarly dividends paid, rather than dividends charged, are shown as a use, so the increase in the dividend creditor is not counted as a source.
- (4) The investment in fixed assets is 8,000 in land and buildings and 12,000 in plant and equipment.

4.26 FLEXIBLE BUDGETS

A flexible budget is a budget which, by recognising the difference between fixed, semi-fixed and variable costs, is designed to change in relation to the level of activity attained (I.C.W.A.)

To flex a budget is to alter it to suit the actual level of activity. In terms of total costs, this means altering the variable costs only. In terms of unit costs it means varying the fixed costs per unit. The individual budgets that are usually flexed are Production Overhead, and Selling and Distribution costs, since these contain both fixed and variable costs. The Administration budget is commonly regarded as wholly fixed, therefore there is no problem in flexing it.

The advantage of flexing a budget is that the comparison of budgeted and actual costs is not made difficult by the difference between budgeted and actual volume. (On the other hand, the volume variance is usually important and should not be lost sight of). Generally speaking, wherever a budget centre is engaged on some activity which can be *measured* in units of output (or standard hours of output) a budget which includes fixed costs can and should be flexed. An example follows of the calculation of a flexible budget for production overhead:

	Monthly production overhead flexible budget							
Percentag	e of normal capacity	80	90	100	110	120		
Standard	hours of production	8000	9000	10000	11000	12000		
Total over	rheads as below Rs.	37600	39600	40000	41800	43200		
Fixed costs:	Executive salaries	6000	6000	6000	6000	6000		
	Rent	2000	2000	2000	2000	2000		
	Deprn. of machinery	3000	3000	3000	3000	3000		
	Insurance	500	500	500	500	500		
	Taxes	750	750	750	750	750		
		12250	12250	12250	12250	12250		
Semi-fixed:	Supervisory salaries	7500	8000	8000	8000	8750		
	Clerical salaries	2850	3000	3000	3000	3500		
	Building services	1200	1300	1300	1300	1350		
Variable:	Indirect labour	11550	12300	12300	12300	13600		
	Factory supplies	7000	7800	8000	9000	9000		
	Maintenance and	2700	2950	3000	3150	3150		
	repairs	2400	2500	2600	2800	2800		
	Spoiled work							
	Power	800	850	850	1000	1050		
		900	950	1000	1300	1350		
		13800	15050	15450	17250	17350		
Total ove	erheads	37600	39600	40000	41800	43200		

Section 6, Appendix 1, para 6 describes the use of flexible budgets for control.

APPENDIX 1

CLASSIFICATION OF FIXED AND VARIABLE COSTS

Note: This is a typical classification only. In any particular firm each cost should be classified according to its actual behaviour.

CIVED	VADIADIE	SEMI- VARIABLE
Production Depreciation of plant by obsolescence (note 2) Wages and salaries of foremen, supervisors, quality inspectors, security staff, factory clerks, work study staff, storekeepers, toolroom staff, works manager and other indirect labour. Preventive maintenance (note 3) Rent and rates. Insurance of assets. Research and development Idle time (note 4) Administration All administration and	Direct materials (raw materials, and components) Carriage inwards Direct wages (note 1) Depreciation of plant and equipment by wear and tear (note 2) Scrap and rework Overtime Materials handling Breakdown repairs and maintenance Petrol, oil, lubricants cleaning rags, small tools, and other consumable stores Machine power	Factory canteen Telephone Lighting
financial costs Selling Salesmen salaries Advertising and publicity	Sales commission and bonuses (note 5)	Travelling and car allowance
Showroom costs Catalogues, price lists, etc. Sales office costs Market research and forecasting Sales training	After-sales service Royalty on sales	Bad debts
Distribution Rent of warehouses	Packing materials Carriage outwards Packers' wages	Delivery van costs Insurance of stock

- Note (1) Direct wages are usually treated as variable, but they are often variable upwards for increased production, but not variable downwards for decreased production for reasons of personnel policy.
 - (2) Often depreciation is not split, and the whole amount is treated as fixed.
 - (3) Preventive maintenance may be increased when plant is shut down, i.e. it is inversely variable, but for planning purposes it may be treated as fixed.
 - (4) Similarly idle time may be inversely variable.
 - (5) Variable selling and distribution costs vary with sales volume. They may be taken as varying with production volume if sales equals production, i.e. if the stock level does not change.

APPENDIX 2

LIMITING FACTOR ANALYSIS & LINEAR PROGRAMMING

Limiting Factor Analysis

Limiting factor analysis means identifying limiting factors, and those products, services, methods or policies that make the best use of such factors, so that management can plan and program its activities to best advantage. While this approach applies with great emphasis when there is one very obvious bottleneck, it also has general relevance, since needs and desires are theoretically unlimited, while resources are all more or less limited.

Limiting factor analysis is useful when one or more factors are permanently or semi-permanently limited, i.e. the bottleneck cannot be broken at least for the time being, and the supply is in practice absolutely limited for a certain period of time. If the limiting factor is constantly changing, e.g. from shortage of supplies, to shortage of sales, to shortage of labour, or back to supplies again, management will of course focus its attention on breaking these successive bottlenecks. Only permanent or semi-permanent shortages lead to limiting factor analysis.

The management accountant's contribution is twofold. In the first place, he should ascertain the *premium value* of the scarce factor, so as to indicate just how important it is to obtain more of it-and perhaps suggest ways and means of doing so. For instance, lack of machine capacity may be met by working existing machines more intensively, e.g. by working overtime or shifts, by reducing downtime by better maintenance planning, ensuring a continuous flow of raw materials and supplies, by closer supervision, incentives to higher productivity, measures to reduce absenteeism, etc. Alternatively, the bottleneck may be short-circuited by contracting out part of the work.

Most of these measures will increase costs. Evidently, production should not be maintained "at any cost". The limit is the point at which

additional revenue from production is exactly balanced by additional costs. Suppose, in a hosiery factory, machines cannot cope with the demand. The product sells for Rs. 6/-, and the present cost is Rs. 4/-, including Rs. 2/50 materials and other variable costs. Overheads are Rs. 1/50, which includes machine depreciation, share of rent, management salaries, etc. It is important to establish how many hours or minutes of machine time are required for each unit of product, and the contribution made by one unit. Investigation shows that, on present methods, one pair of socks requires 30 minutes of machine time. The contribution made by one pair of socks is Rs. 3/50 (Rs. 6/- revenue, less Rs. 2/50 variable costs). Therefore, the value of machine time is $\frac{3.50}{30} \times 60 = \text{Rs.} 7/-$ per hour and it is worth spending up to this to get additional hours. Management should pay overtime premium, or increase maintenance

Management should pay overtime premium, or increase maintenance, or increase stocks, or pay incentive rates, etc. in order to increase effective machine hours by the cheapest method possible but in no case paying more than Rs. 7/- for an extra hour.

Product mix

Secondly, limiting factor analysis applies to the *mix* of products to be made, where there is more than one product. The management accountant calculates the annual contribution per machine hour for *each* product, and recommends increasing production and sale of products showing the highest annual contribution in terms of this limiting factor. This increases aggregate contribution and, after fixed costs are deducted, net profit is increased correspondingly.

This is the general solution to problems involving only one bottleneck factor. Woolworths retail stores, for instance, which usually occupy valuable town centre sites, evaluate the profitability of their product lines by the contribution they make per week per foot of counter space.

It is said that certain publishers of colour magazines in the U. K. are allowed only limited quotas of colour retouchers, highly skilled and essential craftsmen, whose supply is controlled by the powerful printing unions. Thus this is the limiting factor which determines product mix and methods; in effect, those publications are preferred which show the highest contribution per hour of retoucher's time.

Profit/volume ratio

Profit/volume ratio (revenue minus variable costs, divided by revenue) is very similar to gross profit margin, i.e. the margin before deducting the administrative and selling expenses, which are mainly fixed. It is better than net profit margin for ranking products in the short term, since the fixed costs do not vary with mix in the short term. However, it suffers from the same major disadvantage in that it does not consider the time element (turnover) or capital tied up. Which is better? – product A with a margin of Rs. 50/– which takes a month to produce and sell, or product B with a margin of Rs. 30/– which takes only a week, assuming the capital tied up in each is about the same. Product B is better since

it makes Rs. 120/- in the same time that A takes to make Rs. 50/-, using the same capital. Today, turnover is increasingly taken into account by well managed supermarkets.

Another disadvantage of P/V ratio (and NP margin and GP margin also) is that it is a measure of return on revenue, not on the limiting factor. Suppose product A requires very little executive time, but product B is a continuous source of trouble. Then product A may show the higher monthly return per hour of executive time, and should be preferred to B. Alternatively, product A may sell itself, while trained salesmen spend all their time selling product B. P/V ratio reflects the return per rupee of revenue, which is mathematically related to the return per rupee of all variable costs. However, variable costs are paid out costs, not opportunity costs. A product may appear to have a low variable cost and high P/V ratio, but the variable cost may conceal high usage of some scarce resource. For instance, craft products X and Y may both show a variable unit cost of Rs. 5/- against a selling price of Rs. 10/-, and appear to be equally profitable. But if X devours scarce craftsmen compared with Y, it is no defence that X uses relatively little unskilled labour and local materials. Y shows the higher contribution per craftsman-hour.

What is worse, the limiting factor may be classed as a fixed expense, and not enter the P/V ratio at all. Salesman's salaries, for instance, are not usually apportioned to products on the basis of time spent. The P/V ratio of a product may be high merely because it consumes a large share of such overheads; in fact its real profitability may be low.

One difficulty with limiting factor analysis (and N.P. and P/V ratio) is that only one product is the most profitable. Does this imply that only one product should be made out of a range of products? This, of course, is unrealistic. A firm cannot drop the less profitable products so easily, nor should it necessarily do so. A complete range of products attracts customers: the sales of individual products may be inter-related in various ways. What limiting factor analysis provides is a measure of comparative profitability, which can be integrated with sales policy. If products A, B and C show contributions per machine hour of Rs. 4, Rs. 3 and Rs. 1/50 respectively, evidently we should push sales of A and B, even at the expense of C. This is not to say that it would be profitable to drop C. This depends upon an analysis of the market for C. If C makes any contribution to fixed costs and profit it is worth keeping, provided it does not divert purchasing power away from our more profitable products. In the latter case, we lose Rs. 2/50 for every A lost, and Rs. 1/50 for every B lost. If sales policy is to retain C nevertheless, this is the cost of such a policy (while machine hours remain the limiting factor).

Linear programming

A more important limitation on the decision-guiding power of limiting factor analysis is the existence of multiple limiting factors. It may be intuitively apparent that there are two or more limiting factors, e.g.

capital as well as machine capacity, or machine capacity in Department A as well as machine capacity in Department B. Or the existence of second and subsequent limiting factors may be revealed following a one-factor analysis, and a decision to standardise on the most profitable product, e.g.

	X	Y	Z
Contribution (Rs.)	70	53	86
Machine hours in Dept. A	2	3	1
Contribution/hour in Dept. A	 35	17.7	86

Decision: drop X and Y; make only Z

Capacity in Dept. A = 80,000 hours

 \therefore Production of Z = 80,000

However, this is found to be impossible since we run up against a second limiting factor. Z requires 3 hours/unit in Dept. B which has only 120,000 hours' capacity. Maximum production of Z is therefore 40,000. However this leaves 40,000 hours spare in Department A. It is easy to see that total contribution can be increased by making less Z, and filling in with X and Y.

In this highly simplified example, the best mix could be found by making a few calculations, and ascertaining the profit on combinations of X, Y and Z. (The highest contribution is obtained by making 30,000 of X, 20,000 of Z and none of Y). If the number of products and limiting factors were increased, it would soon become impossible to find an optimum production program since the number of possible solutions would be too large.

It should be noted also that the program showing the highest profit does not necessarily imply 100% utilisation of limited resources.

Linear programming is a technique of operations research which shows how to allocate limited resources (staff, money, space, equipment, foreign exchange, etc.) so as to maximise profit, or how to carry out a program of work (which can be done in a number of different ways) at least cost. This has been applied to a wide variety of problems, including:

- (i) how to employ a fleet of vehicles to carry goods from a number of supply points to a number of demand points at minimum cost;
- (ii) how to mix various raw materials to form a product having certain required characteristics, at lowest unit cost, e.g. formulation of food, or blending refinery products, or metal alloys;
- (iii) how to allocate limited machine capacity to products, given the time required on each machine for each product, and product profits. This has been applied for instance to production planning in an Indian textile mill for 40 principal products from 12 different kinds of loom;

- (iv) optimal crop rotation plans;
- (v) optimal purchasing policy.

There are two features common to all the above:

- (1) an objective has to be *optimised*, usually cost is to be minimised or profit maximised;
- (2) there are a number of limitations or constraints imposed. In the transportation problem we cannot take from supply points S_1 , S_2 , S_3 , etc. more goods than are in stock at S_1 , S_2 , S_3 , etc. nor can we deliver to demand points D_1 , D_2 , D_3 , more goods than are required at D_1 , D_2 , D_3 , etc. In blending engine oil, it may be that specific gravity must be at least, say, 0.88, viscosity not more than 32 units, sulphur content not more than 0.35% etc. In allocating machine capacity, there is a constraint for each type of machine, since we cannot allocate more hours than we can run each machine.

Linear programming can solve this type of problem provided the objective and constraints are *linear*, that is, that it costs ten times as much to produce ten items as it does to produce one item, that it takes ten times as much production time, and in general, that the cost (or profit) and the amount of each resource required vary *proportionately* with the number of items produced. (Where this does not hold true the objective may sometimes be optimised by nonlinear programming, but this is far more complex).

The LP toolkit includes various methods and algorithms for solving this kind of problem. Where there are not more than 2 products (and any number of constraints) a solution can be worked out on graph paper. Secondly, a simple algorithm exists for the transportation problem in (i) above. Thirdly, the so-called Simplex method developed by Dantzig, an arithmetic method based on matrix algebra, can be used for any LP problem.

A method closely related to the Simplex method is illustrated below. It needs only arithmetic, simple algebra, and patience. It may be mentioned here that, once the problem is formulated in equations, it can be handed to a computer service bureau which will run off a solution in a few minutes, or even seconds, at a cost of about Rs. 7/- a minute. Thus the arithmetic algebra and patience are not necessary in practice!

An important by-product of the Simplex method is that the final tableau or set of equations contains the premium value of each limiting factor. In the above example, capacity in Department A has a premium value of Rs. 9/50 an hour (over and above its cost), while capacity in Department B has a premium value of Rs. 25/50 an hour. As with one-factor analysis, these are the limits to expenditure on breaking these respective bottlenecks.

Application of techniques

The practical importance of these techniques lies in their decision-guiding power for management. The process of management may be represented in terms of the continuous allocation and re-allocation of men, money, machines and materials to the various products and services required by consumers. On the micro-economic scale, this produces profits; on the macro-economic scale it produces the national product. Essentially the same principles and techniques apply in public sector organisations as in private enterprises. Social costs and benefits may be substituted for private costs and benefits; the problem is then one of maximising social benefits net of social costs. The allocation of resources should still be guided by limiting factor analysis or linear programming. (The economic criterion is not of course the only one).

This Appendix has focussed mainly on how to maximise profits in the private enterprise in shortage situations. Risk factors have been ignored, though in any real situation they must also be considered. In practice, it must also be admitted that problems are not always readily quantifiable. It is not so difficult to ascertain from costing records the contribution from each product or service. This depends only on determining which costs vary with volume. Similarly, some limiting factors are easily quantified; if capital is limiting, the quantity used is shown in the accounts and can usually be broken down over the various products without great difficulty; if the limiting factor is a productive resource, quantities used are usually measured and recorded on a routine basis. However, if executive time or salesmanhours are limiting, records of how these hours are spent do not usually exist, and may need to be estimated, e.g. by keeping time records for a period or by activity sampling, or some other method of work measurement. Of course, the recognition that such personnel are the limiting factors may induce them to plan and control their time much more profitably.

It may fairly be claimed that the mere analysis of activities and identification of limiting factors is worthwhile, even without any measurement of comparative profitability or re-allocation of resources. The exercise may, for instance, reveal that the apparent limiting factors are not the real ones; an apparent shortage of staff may in fact be due to inadequate supervision, or an excessively complicated procedure. The identification of the real limiting factors is part of management's responsibility for getting things done. Limiting factor analysis and linear programming illuminate the area, sharpen management vision, and provide a formula for guiding decisions. The techniques do not of course make the decisions, nor do they allow the manager to escape responsibility; they may add to the effectiveness with which he discharges his responsibility.

SIMPLEX METHOD

(Example adapted from "Mathematics in Management" by A. Battersby (Pelican).

Problem: What quantities of products X, Y and Z should be made in order to get highest profit?

Given:

No limit on sales, raw materials or other resources, except for machine hours in Department A and B. Orders have been placed for additional machinery, but for the coming year, we are limited to 80,000 hours in Department A, and 120,000 hours in Department B. Costs and profits and machine usage are as follows:

			X		Y		Z
		Hrs.	Rs.	Hrs.	Rs.	Hrs.	Rs.
Machine time in Department A @ Rs. 20/hr. Machine time in Department	• •	2	40	3	60	1	20
B @ Rs. 30/hr.		2	60	1	30	3	90
Materials			40		37		44
Variable cost Gross profit (contrib'n to fixed	• •		140	4 -	127	all day p	154
costs & profits)			70		53		86
Selling price			210	-	180	12	240
Seims price							

Procedure: 1. The first step is to express each *constraint* as an equation. In Department A there are 80,000 hours. If we make X units of product X, Y units of product Y, and Z units of product Z, these will require 2X, 3Y, and Z hours in Department A respectively. However, we cannot say 80,000 = 2X + 3Y + Z because there may, even in an optimum solution, be some idle hours. Therefore, we introduce idle hours as a further variable A.

Then,
$$A = 80,000 - 2X - 3Y - Z(1)$$

The figures. -2 -3 -1 are called the *co-efficients* of X, Y, and Z respectively. To describe the situation perfectly, we should add that A, X, Y and Z *cannot* be negative (as they could in ordinary algebra) since this is physically impossible.

Similarly, idle hours in Department B are given by:

$$\mathbf{B} = 120,000 - 2X - Y - 3Z (2)$$

Also B is non-negative.

The objective is to maximise gross profit (P) where

$$P = 70X + 53Y + 86Z$$
 (3)

2. Choose one of the products and see how much we can make of that product. It is usual to take the product showing the highest profit. (We would get to the same optimum if we chose any other product but it would probably take longer). This is Z which shows a co-efficient of 86 in equation (3). If we examine the co-efficient and available hours in equation (1), we can see that Z could go up to 80,000 without making A negative (or X or Y) (which would be a breach of our condition).

In equation (2) Z could go up to 40,000 without making B, X or Y negative. Therefore, equation (2) is identified as the first constraint on profit.

3. Rewrite equation (2) with Z on the left hand side, and B on the right hand side, as follows:-

$$3Z = 120,000 - 2X - Y - B$$

Then unitise Z, by dividing through by 3:

$$Z = 40,000 - \frac{2}{3}X - \frac{1}{3}Y - \frac{1}{3}B$$
 (4)

Now we can rewrite the other equations, transposing for Z,

i.e. including $(40,000 - \frac{2}{3}X - \frac{1}{3}Y - \frac{1}{3}B)$ for each Z on the right hand side.

Equation (1) becomes:

A =
$$80,000 - 2X - 3Y$$

 $-40,000 + \frac{2}{3}X + \frac{1}{3}Y + \frac{1}{3}B$
A = $40,000 - \frac{4}{3}X - \frac{8}{3}Y + \frac{1}{3}B$ (5)
Equation (3) becomes:
P = $70 X + 53 Y$
 $+3,440,000 - \frac{172}{3}X - \frac{86}{3}Y - \frac{86}{3}B$
P = $3,440,000 + \frac{38}{3}X + \frac{73}{3}Y - \frac{86}{3}B$ (6)

4. Examine the new profit equation. If any co-efficient is plus, the profit is not the optimum, since profit can be increased by increasing the appropriate variable. In (6), profit so far is 3,440,000, but this can be increased by increasing X or Y since both of these variables have

positive co-efficients.

Again we choose the one with the higher co-efficient (Y) (since this is likely to lead us to optimum profit sooner), and see which of the constraint equations most limits the value we can place on Y.

In (4) Y could be 120,000 (40,000 $\div \frac{1}{3}$), but in (5) it could not be more than 15,000 (40,000 $\div \frac{8}{3}$).

Therefore (5) is now our first constraint.

5. As with step 3, rewrite (5) with Y on the left hand side and A on the right hand side, then unitise Y by dividing through by \(^8_3\), and transpose for Y in (4) and (6).

Therefore
$$\frac{8}{3}Y = 40,000 - \frac{4}{3}X - A + \frac{1}{3}B$$

 $Y = 15,000 - \frac{1}{2}X - \frac{3}{8}A + \frac{1}{8}B$ (7)
 $Z = 40,000 - \frac{2}{3}X - \frac{1}{3}B$
 $-5,000 + \frac{1}{6}X + \frac{1}{8}A - \frac{1}{24}B$
 $Z = 35,000 - \frac{1}{2}X + \frac{1}{8}A - \frac{9}{24}B$ (8)
 $P = 3,440,000 + \frac{3}{8}X - \frac{86}{3}B$
 $+ 365,000 - \frac{73}{6}X - \frac{73}{8}A + \frac{73}{24}B$
 $P = 3,805,000 + \frac{1}{2}X - \frac{73}{8}A - \frac{205}{8}B$ (9)

Equations (7) to (9) tell us that by making 15,000 Y and 35,000 Z, no X, we make a profit of 3,805,000, but that this can be increased since the co-efficient for X in (9) is positive. By putting a value on X, P will be increased.

6. Which equation first constrains the value we can place on X? In (7) X can be 30,000; in (8) X can be 70,000, therefore (7) is now the first constraint, and we put X on the left hand side, and Y on the right hand side, unitise, and transpose for X.

Therefore,
$$X = 15,000 - Y - \frac{3}{8}A + \frac{1}{8}B$$

 $X = 30,000 - 2Y - \frac{3}{4}A + \frac{1}{4}B$ (10)
 $X = 35,000 + \frac{1}{8}A - \frac{9}{24}B$
 $-\frac{15,000}{20,000} + Y + \frac{3}{8}A - \frac{1}{8}B$
 $X = 20,000 + Y + \frac{1}{2}A - \frac{1}{2}B$ (11)
 $X = 3,805,000 - \frac{73}{8}A - \frac{205}{8}B$
 $\frac{+15,000 - Y - \frac{3}{8}A + \frac{1}{8}B}{3,820,000 - Y - \frac{19}{2}A - \frac{51}{2}B}$ (12)

This is optimum as P cannot be increased by increasing Y, A or B; all co-efficients in (12) are negative.

The solution is:
$$X = 30,000$$

 $Y = Nil$
 $Z = 20,000$
 $A = Nil$
 $B = Nil$
 $P = 3,820,000$

This took 3 iterations or trials. The virtue of the method is that each successive iteration provides a feasible solution at a higher profit (3,440,000; 3,805,000 and 3,820,000), and the optimum solution reveals itself as such. Generally, the number of iterations is 1 to 2 times the number of constraints.

(With hindsight we can see that if we had chosen X instead of Y in step 4, we would have got the optimum in two iterations only, but there was nothing to indicate it).

Further Implications: The above set of equations tells us more than the best production plan. From the profit equation (12) we can see that if we could get an extra hour in Department A, profit would be increased by $\frac{19}{2}$ or Rs. 9/50. (Mathematically, an extra hour over and above our constraint means that A = -1. If this is entered in (12), $P = 3,820,09\frac{1}{2}$).

Similarly, an extra hour in B would increase profit by $\frac{51}{2}$ or Rs. 25/50. These coefficients are called incremental values or premium values (also accounting prices, shadow prices, etc.)

The implication for management is that it is worth spending up to Rs. 9/50 premium to get an extra hour of machine time in Department A, and up to Rs. 25/50 for time in Department B. If overtime can be worked by offering a suitable premium, or downtime reduced by increased

maintenance, or by keeping higher stocks of materials, or by any other means, it is worth doing so provided the extra cost is not more than Rs. 9/50 per hour gained in Department A, and not more than Rs. 25/50 per hour gained in Department B. These figures indicate the profit potential of breaking these bottlenecks.

It may be that a certain amount of product Y must be produced, e.g. to maintain customer goodwill. Suppose that Y must be at least 5,000 units. This might have been introduced as a further restriction at the start. If the extra over 5,000 is denoted by E, with the proviso that E must be non-negative (like all other variables), then we start with a further equation:

$$E = -5,000 + Y$$
 (4)

and we can work out an optimum solution. However, it is an advantage of this method that we can easily rework the optimum given by equations (10), (11) and (12).

Since our previous optimum indicated that no Y should be produced, i.e. Y is unprofitable compared with other products, it is evident that, if we have to produce 5,000 units of Y, no more than that should be produced. We can therefore put Y = 5,000 in the above equations:

$$X = 30,000 - 10,000 = 20,000$$
 (A & B are still nil)
 $Z = 20,000 + 5,000 = 25,000$
 $P = 3,820,000 - 5,000 = 3,815,000$

This shows that we have lost Rs. 5,000 profit by making 5,000 of Y, and our production program is now:

X = 20,000 Y = 5,000Z = 25,000

Pricing and opportunity costs: Going back to our original optimum, the fact that Y is nil indicates that Y is under - priced in relation to other products. We can calculate the opportunity cost of each product and compare this with the price as follows:

Opportunity cost equals paid out cost, plus incremental or premium value.

Opportunity cost of time in Department A = Rs. 20 + incremental 9/50 = 29/50 per hour

Opportunity cost of time in Department B = Rs. 30 + incremental 25/50 = 55/50 per hour

Opportunity cost of materials = bought in cost (no incremental value as materials are not in short supply).

	as materials	are not	III SHOIL	supply j.
Product		X	Y	Ž
Time in Department A @, 29/50		59/-	88/50	29/50
B @ 55/50		111/-	55/50	166/50
Materials		40/-	37/-	44/-
Opportunity cost		210/-	181/-	240/-
Selling price		210/-	180/-	240/-
Loss by making 1 unit of Y			1/-	-
(coefficient in (12))				

If the price of Y is raised Re. 1/-, it no longer has an opportunity cost. If the price were raised more than Re. 1/-, equation (12) would show a positive coefficient for the Y term, and a further iteration would result in a new optimum, including the manufacture of Y. This can be calculated from equations (10), (11) and (12). If the price of Y were increased by, say, Rs. 2/-, - Y would become + Y. Equation (10) would then be the restraint on Y, and optimum production plan would be:

X = Nil Y = 15,000Z = 35,000

[This extreme sensitivity to price is not usual in practice].

Enough has been said to show the usefulness of LP, not only in indicating an optimum production program but in focussing management attention on the important variables. This latter aspect may prove to be even more important than the former.

TYPICAL EXAMINATION QUESTIONS

- 1. (a) Explain the nature of a system of budgetary control, and list the advantages to management of such a system.
 - (b) A company prepares the following main budgets:-
 - (i) Sales budget
 - (ii) Manufacturing budget
 - (iii) Purchasing budget
 - (iv) Selling and administrative overheads budget
 - (v) Budgeted balance sheet

You are required to describe briefly the relationship between these budgets and the content of each. (ICA Final 11/65)

- 2. It is often suggested that the principal budget factor, or limiting factor, is of vital significance to management. Explain this, and suggest what additional complications might arise where there is more than one limiting factor in a business. (ICWA IV 6/65)
- 3. Explain the difference between a forecast and a budget. Give examples to illustrate the difference between:
 - (a) fixed budgets;
 - (b) flexible budgets;
 - (c) functional budgets.

Do you consider that a business should ever budget for a loss on a year's trading? Give reasons for your opinion.

(ICWA IV 12/65)

4. Predetermined product costs for 1966 are as follows:

Product	M	aterial	Labour	Variable overhead	Fixed overhead	Total
A	Rs.	10	5	10	5	30/-
В		22.50	7.50	15	9	54/-
C		30	20	40	18	108/-
D		25	10	20	11	66/-

The preliminary sales budget upon which the predetermined costs are based is:

Product				
A	3,000	units at	Rs.	35
В	6,000			55
C	4,000			105
D	10,000			70

It is suggested that additional sales promotion expenditure would bring additional sales as below:

Product	Suggested	Additional
	Expenditure	Sales
	Rs.	Units
A	 40,000	3,000
В	60,000	7,000
C	 40,000	4,000
D	 60,000	6,000

Prepare a statement for management summarising the sales, costs and profit positions of the preliminary budget and of the other possibilities. (ICWA IV 12/65)

5. A company has the following budget for 1970:-

				Rs.
Sales				600,000
Production costs:				
Less: Raw materials			200,000	
Direct labour			80,000	
Consumable stores			22,000	
Depreciation of plant			28,000	
Maintenance of plant			40,000	
Power			10,000	
Rent & rates on factory		* *	20,000	400,000
Gross profit				200,000
Administration:				
Salaries		45,000		
Office, rent & rates		10,000		
Printing & stationery		5,000	60,000	
Selling & distribution:				
Salesmen's salaries		10,000		
Commission		24,000		
Royalty		30,000		
Carriage outwards		6,000		
Advertising		6,000		
Warehouse rent & rates		4,000	80,000	140,000
	## FX			
Net profit for year				60,000
2.22 P. 222 222 J. W.				,

- Notes (i) Depreciation is charged on a straight line basis.
 - (ii) Maintenance consists of preventive maintenance Rs. 22,000 and break down maintenance Rs. 18,000. The latter is considered variable with production.
 - (iii) Royalty of 5% of turnover has to be paid to the licensors of the product.

Show on a graph the total cost/volume relationship, break-even point, and margin of safety in 1970. (ICAC Final 12/65)

6. In a particular budget period, a company's sales are represented by 5,000 units of Rs. 10 each. The costs involved are Rs. 2 per unit for variable costs and Rs. 20,000 for fixed costs. The variable costs are payable in cash in the budget period, but Rs. 5,000 of the fixed costs consist of expenditure incurred in previous years for advertising, research and development, together with depreciation of fixed assets. The company has also borrowed money by issuing debentures and the interest thereon amounts to Rs. 5,000.

Prepare a cash break-even chart from the above information, showing clearly the cash break-even point. (ICAC Final 6/68)

7. A manufacturing company produces and sells three products X, Y and Z. From the accounts of the past year, the following information is available:

Product	Selling price per unit	Profit/volume ratio	Percentage of total sales
			by units
	Rs.	0/	
X	50	ĺŎ	50
Y	37.5	20	40
Z	25	40	10
Total fixed cos	ts Rs 32 500		

Management is concerned that the overall profit picture might be improved by selling a greater proportion of more profitable lines. After a full investigation it is found that the following sales mix should be possible in future.

Product		%
		by units
X		30
Y	• •	50
Z		20

Present the following information to management:

- (a) a break-even chart for the existing sales mix showing the combined units of sale in 1,000 unit intervals up to a maximum of 7,000 units;
- (b) a profit-volume graph for both the existing and proposed sales mix over the same range as in (a) above.

 (Adapted from ICWA IV 12/67)
- 8. The results displayed by a break-even chart must be qualified by the assumptions underlying its construction. What are these assumptions and to what extent do you regard them as reasonable?

 (ACCA Final 12/65)
- 9. Your company manufactures two products A and B. A forecast of the number of units to be sold in the first seven months of 1968 is given below:

		Product	Product
		A	В
January		1,000	2,800
February		1,200	2,800
March		1,600	2,400
April		2,000	2,000
May		2,400	1,600
June	9 6.0	2,400	1,600
July		2,000	1,800

It is anticipated that:

- (i) there will be no work-in-progress at the end of any month;
- (ii) finished units equal to half the sales for the next month will be in stock at the end of each month (including December 1967).

Budgeted production and production costs for the year ending 31st December, 1968 are as follows:

Production (units)		Product A 22,000	Product B 24,000
		Rs.	Rs.
Direct materials per unit		12.50	19.00
Direct wages per unit		4.50	7.00
Total factory overhead apportioned	to	HARMAN S	
each type of product		1,320,000	1,920,000

Prepare for the 6 months period ending 30th June, 1968 a production budget for each month and a summarised production cost budget.

(Adapted from ICWA IV 12/67)

10. (a) It has been said that, since standard costs are estimates, the comparison of actual with standard merely tests the accuracy of the estimating.

Comment on this statement, explaining why you agree or disagree.

- (b) Is a standard cost what a product or process did, should, will or might cost? Explain.
- 11. The accounts for a manufacturing company for a year are as follows:

		Rs.
Direct materials		175,000
Direct wages		100,000
Variable factory overheads	 	100,000
Fixed factory overheads	 	100,000
Other variable costs	 	80,000
Other fixed costs		80,000
Profit		115,000
Sales		750,000

Two products, A and B, are manufactured, and during the year output and costs were as follows:

		A	В
Output (units)	 	200,000	100,000
Selling price (each)	 	Rs. 2/-	3/50
Direct materials (each)	 	0/50	0/75
Direct wages (each)	 	0/25	0/50

Factory overheads are absorbed as a percentage on direct wages; other overheads, half fixed, half variable, have been computed to amount to Rs. 0/50 per unit for product A and Rs. 0/60 per unit for product B. During the coming year it is expected that demand for product A will fall by 25%, and for product B by 50%: it is decided to manufacture a further product C, the costs, etc., for which are estimated as follows:

Output (units)	 	200,000
Selling price (each)	 Rs	s. 1/75
Direct materials (each)	 to Service of	0/375
Direct wages (each)	 	0/25

It is anticipated that the other variable costs per unit will be the same as for product A.

Compile a budget to present to management, showing the current position, and the anticipated results for the coming year.

(Adapted from ICWA 6/61)

12. Your Corporation is to manufacture a new product designed to sell at Rs. 25/- each. The annual output is estimated to be 6,000 and no fluctuations in production are anticipated. The unit costs are as follows:

Materials	Rs.	10/-
Labour		4/-
Overhead		6/-

Materials are bought on one month's credit, and stores equivalent to three months' issues will normally be on hand. The manufacturing cycle is two months and finished goods are in stock on an average for a further month. Customers are to be allowed two months for payment.

Assuming that there is no lag in payment of wages, that both wages and overheads accrue evenly, and that a cash float of Rs. 10,000 will normally be held, calculate the working capital required.

(DPFM II 1/68)

13. A company expects to double its rate of production by starting a second shift, and asks you to calculate the extra working capital required. You ascertain that materials are in stock for an average of 3 weeks before issue, and finished goods for 8 weeks before sale. The production process averages 2 weeks; labour and expenses are incurred evenly during this period and are paid on average 1 week after being incurred. Whereas suppliers are paid 4 weeks after invoice (which usually arrives 1 week after the relevant supplies), customers take an average of 10 weeks to pay.

The present scale of production is 1000 units/week, and the selling price is Rs. 10. Unit production costs are estimated as follows:-

		on 1000/week	on 2000/week
Materials		3/00	3/00
Labour	• •	2/00	2/20
Expenses (variable)	***	2/00	2/00
Expenses (fixed)	***	1/00	-/50
		8/00	7/70
		0/00	7/10

14. Ceylon International Ltd. are manufacturers of a single product. Its cost structure is as follows:

		Rs.
Materials 4 lbs. @ Re. 3/		12
Labour 2 hours @ Rs. 1/		2
Variable overhead		1
Fixed overhead (based on month	ly	
production and sale of 10,000)		4
		19
Profit		3
Selling Price	Rs.	22

Materials are stocked four months on average due to import licensing difficulties. The finished product takes one month to produce, and is produced only to order. All creditors (purchases and expenses) are paid at the end of the month following the month of receipt of goods or services. Labour is paid monthly. Average collection period is two months.

By substituting a cheaper material it is thought that the selling price can be reduced and overall sales and profit increased.

(i) Calculate what change in working capital would be required on the following data: Materials - 4 lbs. @ Rs. 2/- per lb. (local material - only 2 months' stocks required); Labour - 3 hours required due to extra purifying process.

Overhead - no change

Sales - 15,000 at Rs. 20/-

- (ii) If fixed overhead includes Rs. 10,000/month depreciation, calculate the change in overdraft facility required.
- 15. Your company proposes to undertake a new industrial venture and the following forecasts for eight months to December 31st are available. Ascertain the cash that should be provided to enable the business to be conducted. Your workings should be provided in the form of a suitable statement;

Month	Purchases	Cash sales	Wages	Works expenses	Admin. expenses	Payments to C.I.S.I.R.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
May	55,500	132,750	12,000	8,520	3,750	3,600
June	60,000	126,000	12,600	8,880	4,140	3,600
July	58,590	139,500	13,200	8,160	3,720	3,600
August	59,850	108,000	9,000	8,820	3,900	3,600
Sept.	52,500	123,750	14,400	9,000	3,780	3,600
Oct.	54,600	147,900	12,000	8,520	4,050	3,600
Nov.	54,860	139,200	12,600	8,040	3,840	3,600
Dec.	49,200	156,600	11,400	8,770	3,930	3,600

Cash payments and receipts are estimated to take place in the following manner:

Wages payable with a time lag of one-eighth of a month, works expenses, administration expenses and payments to C.I.S.I.R. with a time lag of one month.

Suppliers allow credit for two months for purchases. Selling and distributing expenses are to be allowed for at 10 per cent on sales, payable in the month following sales. Machinery will be purchased at a cost of Rs. 114,000 and buildings at a cost of Rs. 240,000 in July, on the arrangement that cash will be paid on delivery of machinery and the payment for the buildings will be in four quarterly payments commencing in August. (CTC Dip. 63)

16. Mr. De Silva wishes to set up a factory to manufacture plastic cloth and has approached you for advice.

He gives the following information:-

Cost of land including fencing is Rs. 30,000. Floor area of factory is 100,000 sq. ft. and the cost of building is Rs. 12/50 per sq. ft. The installation of sanitary and electrical fittings would cost Rs. 8,500. The machinery is to be imported at a c.i.f. value of Rs. 215,000 and the duty payable is $2\frac{1}{2}\%$. Transport and installation costs of the machinery will amount to Rs. 2,500. Office furniture and fittings would cost Rs. 5,000. He also proposes to buy a light van for Rs. 15,000.

The planned output is 30,000 yds. per month and there is a market for the total output at a selling price of Rs. 2/50 per yd. The production process is very simple and fully automatic. Cloth is fed in at one end, the plastic coating is done on the machine, and the finished product passes out at the other end automatically guillotined into 50 yard lengths.

Cloth can be purchased locally at Re. 1/- per yd. but the plastic solution has to be imported at a cost of Rs. 50/- per gallon delivered

to factory. A gallon of this solution can coat 50 yds. The direct labour will be 12 girls employed on production, and paid at the rate of Rs. 100/- per month.

The total factory overheads exclusive of depreciation would amount to Rs. 10,000 per annum. The total administration overheads exclusive of depreciation would amount to Rs. 20,000 per annum. The cost of running the van exclusive of depreciation would amount to Rs. 7,000 per annum.

Mr. De Silva wishes to know the capital requirements and also requires a statement showing the profitability of the undertaking at the end of the first year.

(Provide for depreciation at 5% on buildings, 10% on machinery, 10% on furniture & fittings, and 20% on the van. In your Capital Requirements Statement provide for one month's stock of raw cloth and 3 months' stock of plastic solution, and provide Rs. 200,000 for stock of finished goods, debtors outstanding, etc.)

(CTC Dip. 62)

17. A small private company, after several unprofitable years was taken over by a new management on the 31st December.

The accounts for the following year were as follows:

		Rs.
Direct materials	 	78,000
Direct wages		31,200
Variable overheads		15,600
Fixed overheads (including		
14,400 depreciation)	 	30,000
Profit		1,200
Sales	 	156,000
Daios		12

The balance sheet as at the end of the first twelve months trading was as follows:

Share capital Creditors Bank overdraft	9,800	Fixed assets Stocks of materials Debtors P/L Account	 20,000 14,000 42,000 10,000
	86,000		86,000

The budgeted sales for the second year are as follows:

1st quarter	42,000
2nd quarter	 42,000
3rd quarter	 51,000
4th quarter	51,000

It is anticipated that the ratios of material consumption, direct wages and variable overheads to sales are unlikely to change, and that fixed overheads (incurred evenly during the year) will remain at Rs. 30,000 per annum.

Raw materials are purchased so that at the end of each month, there is sufficient in stock for the next 2 months' production. Production is for immediate sale; there are no stocks of finished goods. The production period is very short, and work in progress may be ignored. Materials and expenses are purchased on one month's credit. Wages are paid without delay. Customers are allowed 2 months' credit, but in fact take an average of 3 months.

- (i) Prepare quarterly Profit and Loss and Cash budgets for the second year;
- (ii) What increase will there be in working capital (excluding overdraft) in the second half of the year?
- 18. The Balance Sheets of Traders Ltd. at 1st January and 30th June, 1964 are given below. You are required to prepare a statement in a suitable form to be presented to the Board of Directors to show the sources and the application of funds for the six months to June, 1964.

	1st		30th	
	January		June	
	Rs.		Rs.	
Capital Employed				
Share Capital and	141,000		141,000	
Capital Reserves			,	
General Reserves	49,307		49,307	
Profit & Loss Account	,		, , , , , , , , , , , , , , , , , , , ,	
for the period			4,163	
Sundry Creditors	10,650		10,650	
	200,957		205,120	
Assets				
Land & Buildings at cost		36,000		36,000
less depreciation		20,000		20,000
Plant & Machinery at cost	108,000		109,710	
less Depreciation	57,000	51,000	62,400	47,310
ress Depreciation		31,000	02,400	77,510
		87,000		83,310
Trade investments at cost		16,500		16,500
Stocks of raw materials		16,260		18,510
Work in progress and finished	d goods	23,287		18,488
Debtors & cash	a goods	57,910		68,312
Deotors & cash		37,910		00,312
		200,957		205,120
		200,737		203,120
		(C	TC Din	1964)
			TC Dip.	1964)

19. You are introduced to a new client company by a friend who sends you the latest accounts for your consideration prior to introducing you to the managing director.

The accounts include:-

SUMMARISED BALANCE SHEET - 31st MARCH 1967

		Autho- ised	Issued and			
1966		F	ully Pd.	1966		
	Share Capital: 50,000 5%	Rs.	Rs.		Fixed Assets (see note 1)	Rs.
44,257	Preference shares of Re. 1/-	50,000	44,257		Freehold & leasehold pre-	
29,585	200,000 Ordinary shares of 5/-	50,000	29,585	67,314	mises	66,935
73,842		100,000	73,842	40,466	Plant, equip- ment & motor vehicles	41,098
				107,780		08,033
						100,033
				1	Goodwill and copyrights	1
	Reserves:				Investments at cost	
5,694	Capital	5,694		2,328	Leasehold re- demption	2,421
11,128	Revenue surplus	12,831	18,525		policies	
-	Future Taxation		565			
90,664			92,932			
	Current Liabi- lities:				Current Assets	
31,981	Bank overdraft (secured)	32,726			Stock & work-in	
62,676	Cr. & accrued	54,732		33,553	progress	37,718
1,488	expenses Dividends	2,422	89,880			
	payable			43,027	Debtors (less prov'ns) and prepayments	34,372
				120	Cash and bank	267
186,809			182,812	186,809	1	182,812

Profit and Loss Account

Year en					d 31st
Rs.	h, 1966 Rs.			March Rs.	
15,282		Balance on trading Deduct:	•		18,360
	2,728	depreciation of plant, equipment and motor vehicles	3 076	2,760	
		11-11	. 4	287 92	
			. 1715	450	
11,596	8,040	directors' remuneration (see note 2)		8,357	11,946
3,686	- - -	Profit for the year before charging taxation Deduct:	n		6,414
(10)	March 1	taxation based on the profit for the year-income tax at 50% less capital allowances			798
3,696	2.434	Profit after charging taxation Deduct dividends for the year:- preference dividend		2,434	5,616
3,174		ordinary dividend at 5%.	•	1,479	3,913
522		Surplus for the year carried to balance she	et .	935	1,703

Notes to the accounts :-

Cost 1	on Net	
Rs.	Rs.	Rs.
75,200	8,265	66,935
75,200	7,886	67,314
85,639	44,541	41,098
82,247	41,781	40,466
	Rs. 75,200 75,200 85,639	75,200 8,265 75,200 7,886 85,639 44,541

Since 31st March, 1967, a freehold property costing Rs. 40,000 has been sold for Rs. 160,000.

(2) Directors' remuneration consists of salaries and pension contributions of full-time working directors.

Prepare a statement for the year ended 31st March, 1967 showing the source and application of funds and cash flow.

20. The accounts of M Company Ltd. for the year ended 30th April, 1967 are summarised as follows:

Balance Sheet		30th April	30th April 1966
		Rs. 000	Rs. 000
Fixed Assets:			
at cost to 30th April 1966		200	a material for
additions at cost	100.02	30	
The second secon		The second secon	

roses Amous & Hillier - to the from		230	220	200
less sales	A WILLIAM IS	(10)	220	200
Depreciation provision at 30th	April 1966	(100)		
additional provision	· ·	(8)		
		(108)		
less withdrawals		3	(105)	(100)
			115	100
Current Assets:				
Stocks and work-in- progress			123	75
Sundry debtors			60	50
Cash at bank and in hand	.,		5	25
			303	250
			303	250
Ordinary share capital			65	65
Preference share capital			19	44
Profit & loss account:				
Balance at 30th April 1966		65		
less dividends paid	•	(10)		
		55		
add profit for year		23	78	65
add profit for year	* *		70	03
Tax due 1st January 1969			10	10
Mortgage debentures	- N		65	
Sundry creditors (including curr	ent taxation)		66	66
			202	250
			303	250
D. Ct 1 I A C 1		1 20.1	11 1067	

Profit and Loss Account for the year ended 30th April, 1967

Sales	Rs. 000 Debit	Rs. 000 Credit 597
Profit on disposal of fixed assets		6
Works cost of sales	350	
Administration expenses	210	
Depreciation of fixed assets	8	
Preference share dividend	2	
Provision for tax	10	
Net profit after tax	23	
	603	603

Using the foregoing accounts, you are required to:

(a) prepare a working capital flow statement for the year ended 30th April, 1967, showing the sources and disposal of working capital funds;

- (b) explain how such a statement differs from a quick asset flow statement and a cash flow statement;
- (c) explain the purpose of these various statements.

 (Adapted from ICWA V 12/67)

SUGGESTED ANSWERS

- 1. (a) Budgetary control means control based on a pre-determined plan or budget. There are five essential elements:
 - (i) the plan for the period must be broken down into individual personal responsibilities.
 - (ii) each responsibility must be defined in budget terms, that is, achieving a certain output (or revenue) within certain resource inputs (or cost)
 - (iii) accounts must be kept to record actual outputs and inputs (quantities, revenues and costs).
 - (iv) actual figures must be continuously compared with budget figures and differences (variances) analysed by cause.
 - (v) action must be taken so that adverse differences are corrected, and favourable differences continued, so that the plan is achieved.

The advantages of budgetary control are as follows:

- (i) all levels of management are forced to formulate and clarify their objectives and responsibilities, which reveals inconsistencies with overall policy, and with the company plan, and between one department and another, and makes proper co-ordination possible,
- (ii) all levels of management have to look ahead and anticipate their problems e.g. to calculate their resource requirements and check their availability, thus shortages and hold-ups can be avoided.
- (iii) better communication; the requirements of policy are communicated downwards, and are reconciled at each level with the practical problems communicated upwards,
- (iv) better motivation and co-operation, as each person contributing to a plan sees how his part fits in with others,
- (v) a good budget is a basis for control; if the budget fits the company objectives, then budgetary control ensures the attainment of these objectives.
- (vi) budgetary control is expected of any fair-sized firm seeking outside finance, as an indication of good financial management.
- (b) (i) A sales budget contains sales by quantity and value, analysed by product, by month, and by sales branch or area (or even by salesman). Export sales would be distinguished from home sales. Sales through agents may be distinguished from direct sales, or by any other channel of distribution.

If production capacity is more limited than sales demand, the sales budget is based on the production budget and finished stocks budget.

(ii) A manufacturing budget contains production quantities and costs, analysed by product, by month, by cost item (i.e. raw materials, direct labour, depreciation etc.), and by production department or cost centre. Fixed costs should be separated from variable costs, and rupee costs from foreign exchange costs.

If sales is the limiting factor, the manufacturing budget is based on the sales budget and finished stocks budget.

(iii) The purchasing budget contains the cost of each raw material, component, consumable item, packing material, stationery, etc. to be purchased during the budget period. Quantities are also shown where they are significant.

A purchasing budget may also include services to be purchased, such as maintenance by outside contractors, rents payable, etc.

Capital expenditure is more usually in a separate budget.

Costs are analysed by month and by cost centre responsible.

Quantities depend mainly on the level of production, but non-production materials (e.g. parts for research and development, stationery for administration and sales, petrol for distribution) will depend on the respective functional budgets.

(iv) Selling and administrative overheads budget includes the cost of all selling activity (salesmen's salaries, commission & travel expenses, sales office and showroom overheads, etc.) and administration costs, analysed by month and by cost centre (department or branch) responsible. Selling costs are sometimes analysed by product also.

If distribution expenses (sales vans, warehouses, carriage outwards, etc.) are not separately budgeted, they will be included in the selling costs budget.

Selling and distribution costs depend closely on the sales budget and its mix of products, channels of distribution, etc.

Administration costs depend on the numbers of personnel and facilities required to administer to all other functions.

(v) The budgeted balance sheet contains the assets, liabilities and capital position of the company at the end of the budget year, resulting from all other budgets.

2. The principal budget factor, or limiting factor, is the factor which first limits the profit potential of a firm owing to its short supply. Profit may be limited because of a physical limiting factor on the production side, such as supplies of raw material, or plant capacity, or parts for plant maintenance and repairs, or certain kinds of skilled labour or even factory or warehouse space. Alternatively, the limiting factor may be *finance*, i.e. additional raw material, plant, labour, etc. may be physically available but the firm may not be able to purchase them owing to lack of funds.

If all resources are in ample supply and can be paid for, the limiting factor is usually sales *demand*.

Every firm has at least one limiting factor at all times, and it is extremely important to identify it for two reasons:

- (i) it may be possible to increase the supply of the factor, i.e. to break the bottleneck, and so increase the firm's profit.
- and (ii) if it is not possible to increase the supply (at least in the short term), the firm should make those products which make the best use of the scarce resource, i.e. the highest contribution per unit of limiting factor, so as to increase the firm's profit. Also it should adopt the methods and policies which use the limiting factor most economically, and concentrate managerial controls on proper control of that factor.

Limiting factor analysis is therefore of fundamental importance in financial evaluation and review, planning, budgeting, and control.

If there is more than one limiting factor, it is possible that one product (or method or policy) will make better use of one factor, and another product will make better use of another factor. In this situation, the highest profit will be made by a certain mix of products; this can be found by linear programming.

3. A forecast is a prediction of what will happen given certain policies of the firm, e.g. future sales, given certain selling prices, certain advertising policies, channels of distribution, retail outlets, sales training, etc.

A budget is a forecast selected from a number of different forecasts, each one based on a different set of policies. In effect, it is a selection of the set of policies which will best achieve the objectives of the organisation. It then becomes a statement of intention, or target.

- (a) A fixed budget is one based on a single expected level of production and sales.
- (b) A flexible budget is a set of budgets covering a range of possible levels of production and sales, where the actual level cannot be controlled by the firm. The firm chooses the appropriate budget after the event, and compares it with actual results.

A simple illustration is as follows:

Production overhead - flexible budget

Output	8,000	10,000	12,000	14,000
	tons	tons	tons	tons
Fixed costs Semi-variable costs Variable costs	15,000	15,000	15,000	15,000
	5,000	5,500	6,000	6,500
	12,000	15,000	18,000	21,000
Total budgeted cost Rs.	32,000	35,500	39,000	42,500

(c) A functional budget is a budget for a function of the organisation, such as sales, production, selling costs, distribution costs, research and development.

A business may budget for a loss on a year's trading for any of the following reasons:

- (i) sales depression may result in lower than break even sales.
- (ii) a new product may cause temporarily high costs (e.g. due to research and development, tooling costs, market launching, etc. being written off in the first year), and/or temporarily low sales, until demand builds up.
- (iii) costs of re-organisation or any other exceptional or non recurrent item.

All the above are temporary causes of loss; a firm would not budget for a loss which it expected to continue, as it would then be better to cut the losses and wind up.

For each of the above temporary causes of loss, the firm should aim to minimise the loss.

4. Preliminary budget

	Α	В	C	D	Total
Sales volume (units)	3000	6000	4000	10,000	
Sales revenue Less variable costs: Material Labour Variable overhead	Rs. 105,000 30,000 15,000 30,000	Rs. 330,000 135,000 45,000 90,000	Rs. 420,000 120,000 80,000 160,000	Rs. 700,000 250,000 100,000 200,000	Rs. 1,555,000 535,000 240,000 480,000
Contribution less fixed overhead Net profit	30,000 15,000 15,000	60,000 54,000 6,000	60,000 72,000 -12,000	150,000 110,000 40,000	300,000 251,000 49,000
Contribution/unit	10	10	15	15	

Other Possibilities

Additional sales promotic	n	A	В	C	D
expenditure	Rs.	40,000	60,000	40,000	60,000
Additional contribution	Rs.	30,000	70,000	60,000	90,000

Net profit is increased by additional sales promotion expenditure on B, C and D, but not A.

Suggested Budget based on Additional Promotion of B, C & D.

	A	B	C	D	Total _
Sales volume (Units)	3000	13,000	8,000	16,000	
Sales revenue less variable costs:	Rs. 105,000	Rs. 715,000	Rs. 840,000	Rs. 1,120,000	Rs. 2,780,000
Material Labour	30,000 15,000	292,500 97,500	240,000 160,000	400,000 160,000	962,500 432,500
Variable overhead	30,000	195,000	320,000	320,000	865,000
Contribution	30,000	130,000	120,000	240,000	520,000
Less fixed overhead					411,000
Net profit					109,000

N. B. to Students: It is not necessary to apportion fixed overhead since the decision on each suggested expenditure depends only on the contribution it makes. (In this case it is not even possible to re-apportion overhead as the bases of apportionment are not given).

A major assumption above is that fixed overhead does in fact remain fixed even though the level of activity is almost doubled.

5. See graph overleaf

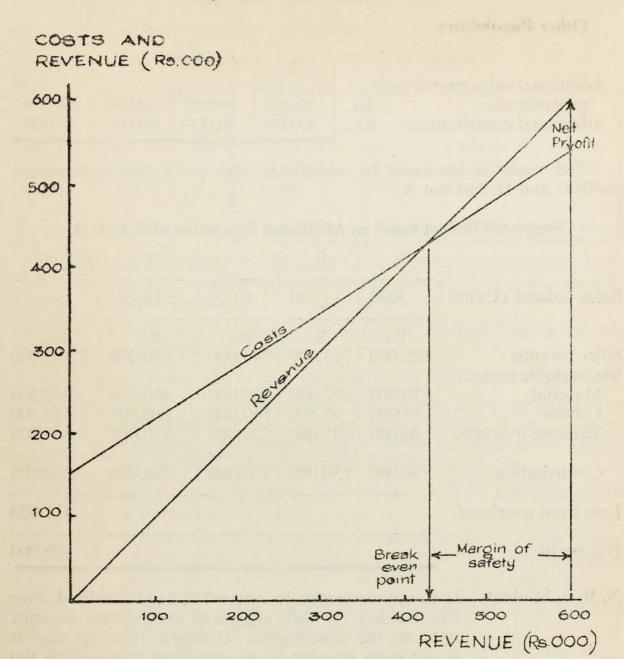
Break-even point
$$= \frac{\text{fixed costs}}{\text{contribution}} \text{ x revenue}$$

$$= \frac{150,000}{210,000} \text{ x } 600,000$$

$$= \text{Rs. } 430,000 \text{ approx.}$$

$$= 600,000 - 430,000$$

$$= \text{Rs. } 170,000 \text{ or } 28\% \text{ of budgeted sales}$$

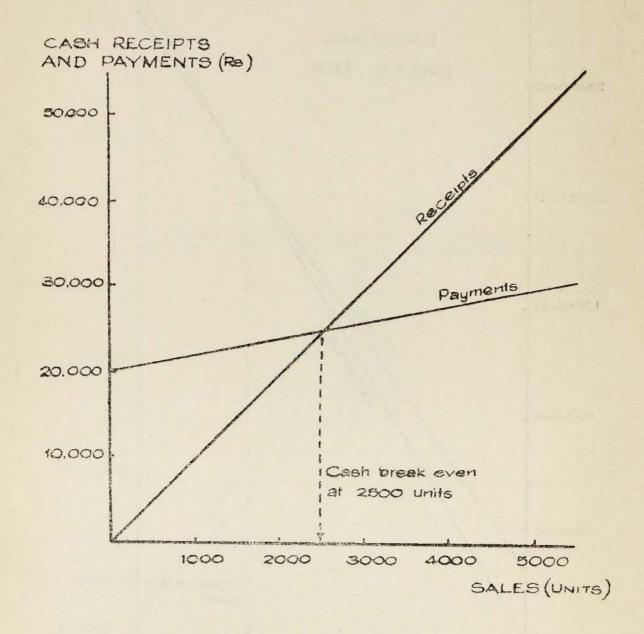


(Fixed costs are as follows:

		Rs.
Depreciation of plant		28,000
Preventive maintenance		22,000
Rent and rates on factory		20,000
Administration		60,000
Salesmen's salaries		10,000
Advertising		6,000
Warehouse rent and rates		4,000
		150,000

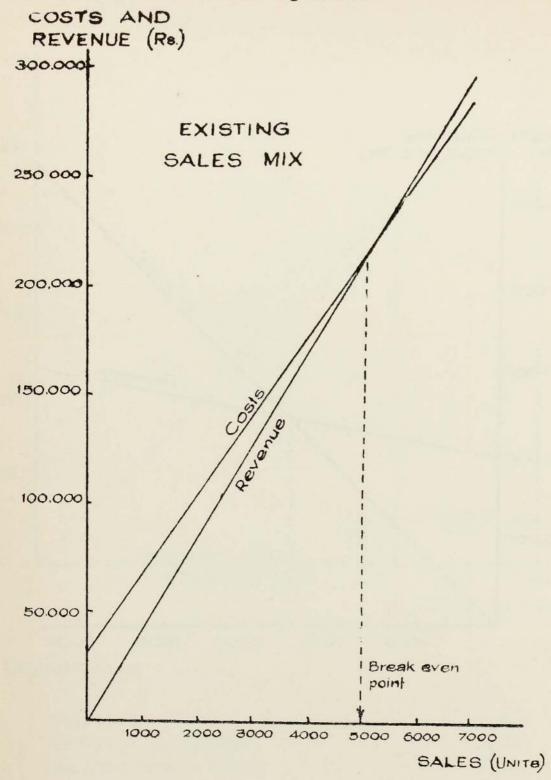
All other costs are taken as variable).

6.



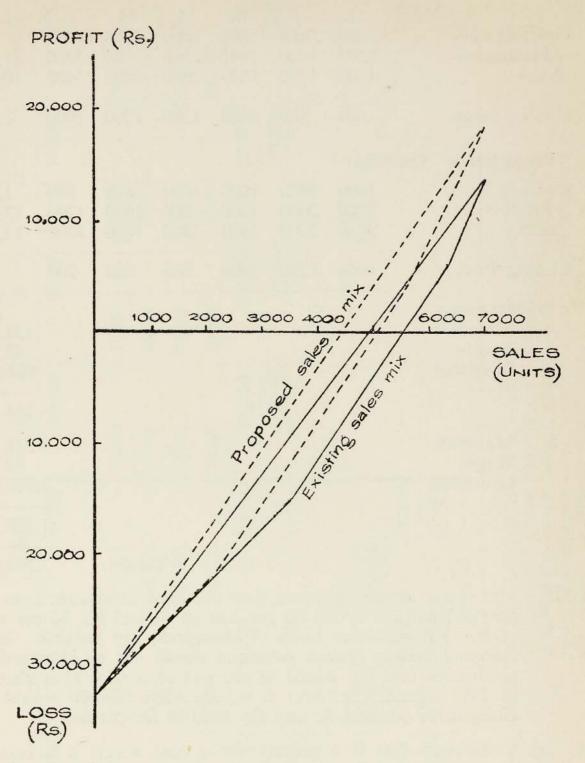
Note to Students: At nil production & sales, cash payments would be Rs. 20,000 (Rs. 15,000 cash fixed costs, + Rs. 5,000 debenture interest). At 5,000 production & sales, cash payments would be Rs. 30,000 (Rs. 10,000 variable costs, + Rs. 20,000 fixed costs). Receipts vary with sales, starting at nil for nil sales. Receipts = payments when 2500 units are produced and sold. (This is not the same as profit break - even point).

7. (a) Break even chart for existing sales mix



- 8. A break-even chart shows the profit and margin of safety at any given volume, and the break-even volume, on the following assumptions:
 - (i) that fixed costs are in fact fixed for all volumes from nil to above 100% capacity. This is not reasonable for a range of volume more than, say, 20% above and below the normal volume, as fixed costs tend to be "stepped", e.g. for a big increase in production, additional salaried staff may be required, or even additional equipment giving rise to increased depreciation, etc.

7. (b) Profit/volume graph for existing and proposed sales mix



8. (continued)

- (ii) that variable costs are proportionately variable with volume. This is not true of all variable costs, as economies of scale can apply, e.g. purchase of raw materials in bulk,
- (iii) that sales revenue is proportional to volume. In practice, the firm can get additional sales at lower prices, e.g. on export sales, or by giving quantity discounts,
- (iv) the chart shows the results from a single product, or a certain mix of products. In practice most firms sell more than one product, and the mix varies.

9. Production A - Quantity:

	J	F	M	A	M	J S	ummary
Opening stock	500	600	800	1000	1200	1200	500
+ Production	1100	1400	1800	2200	2400	2200	11,100
-Sales	1000	1200	1600	2000	2400	2400	10,600
Closing Stock	600	800	1000	1200	1200	1000	1,000
Production B - Qua	ntity:						
Opening Stock	1400	1400	1200	1000	800	800	1,400
+ Production	2800	2600	2200	1800	1600	1700	12,700
-Sales	2800	2800	2400	2000	1600	1600	13,200
Closing Stock	1400	1200	1000	800	800	900	900
Product costs:		<u> </u>					
A Materials							138,750
Wages							49,950
Overhead		1 4 .		40.40			666,000
							854,700
B Materials							241,300
Wages							88,900
Overhead						1	,016,000
						1.	,346,200
				T	otal	2	,200,900

- N. B. The above answer assumes that overhead is absorbed on an output basis, i.e. at Rs. 60 per unit of A, and Rs. 80 per unit of B. Various other bases of absorption are possible. In a marginal costing system, overhead would not be absorbed in production cost but would be charged on a time basis directly to P/L account; i.e. over 6 months, Rs. 660,000 would be charged for product A, and Rs. 960,000 for product B.
- 10. (a) A standard cost is a predetermined cost which is calculated from management's standards of efficient operation and the relevant necessary expenditure. (ICWA)

An estimate, by contrast, is a cost prediction, which is not necessarily based on management's standards of efficient operation.

A standard cost is a norm; if it is not attained, operations have not come up to management's standards of efficiency, and it is necessary to ascertain the causes and prevent repetition.

If an estimate is not attained, the estimate was inaccurate.

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CURRENT YEAR

K

1	825,000					515,000	310,000		180,000	130,000
TOTAL	00	187,500	112,500	112,500	102,500	5		io min	154	
	350,000					225,000	125,000			
0		75,000	20,000	20,000	50,000					
М	175,000	37,500	25,000	25,000	15,000	102,500	72,500			
· ·	300,000	75,000	37,000	37,500	37,500	187,500	112,500			
Total	750,000	175,000	000,001	000,001	80,000	455,000	295,000	100,000	180,000	115,000
В	350,000		=			205,000	145,000		80,000	65,000
		75,000	50,000	50,000	30,000			50,000		
	400,000					250,000	150,000		100,000	50,000
A		100,000	50,000	50,000	50,000			50,000		
	Sales Rs. less variable costs:	Direct	Direct	Variable Factory O/H	Other		Contri- bution	costs: Factory O/H Other		Net profit Rs.

Note to students: The

that product C may be fairly charged. However, it is not necessary or desirable to assume bases of apportionment for the purpose of presenting a budget, since over the course of a year changes in product mix will make no difference to fixed costs.

(b) A standard cost is what a product or process *should* cost. It is determined before the event, and is based on management's ideas on what should be made to happen.

12. Calculation of Working Capital required

Stocks of raw materials:	Rs.	Rs.
3 months x 500/mth x Rs. 10/unit		15,000
Work in progress:		, , , , , , ,
Materials component: 2 mths x 500/mth x Rs. 10	10,000)
Labour component: 1 mth x 500/mth x Rs. 4	2,000)
Overhead component: 1 mth x 500/mth x Rs. 6	3,000	
		15,000
Stock of finished goods: 1 mth x 500/mth x Rs. 20		10,000
Debtors: 2 mths x 500/mth x Rs. 25*		25,000
Cash		10,000
		75,000
less Creditors: 1 mth x 500/mth x Rs. 10		5,000
Working capital required	··	70,000

^{*} Of this, Rs. 5 is profit, i.e. the *cash* required to finance working capital would be Rs. 70,000 - (2 mths x 500/mth x Rs. 5) = Rs. 65,000.

Assumptions (i) materials are all issued at the start of the production cycle, whereas labour and overhead are added evenly during the cycle.

(ii) no credit allowed on overhead expenses.

WORKING CAPITAL CALCULATION
Single shift
Double shift

	Single Sint	Double silit	
Stock of raw		Rs.	Rs.
materials	3 wks x 1000 x Rs. 3	9,000 3 wks x 2000 x Rs.3	= 18,000
Work in			
progress: Materials			
component	2 wks x 1000 x 3	6000 1 wk x 2000 x 3 =	6000
Labour	2 WKS X 1000 X 3	1 WK X 2000 X 3 =	6000
component	1 wk x 1000 x 2	2000 ½ wk x 2000 x 2/20	2200
Variable		2000 x 2/20	2200
expenses	1 wk x 1000 x 2	2000 3 wk x 2000 x 2	2000
Fixed expenses	1 wk x Rs. 1000/wk	1000 $\frac{1}{2}$ wk x Rs. 1000/wk	500
		11,000	10,700
Finished goods			70 123,200
Debtors	10 wks x 1000 x Rs. 10	100,000 10 wks x 2000 x Rs. 10	200,000
Cash (ignore)			
r 0 11.		184,000	351,900
Less Creditors	5 1 1000 2 1	5 000	
materials		5,000 5 wks x 2000 x 3/-	30,000
labour variable	1 wk x 1000 x 2	2,000 1 wk x 2000 x 2/20	4,400
expenses	1 wk x 1000 x 2	2,000 1 wk x 2000 x 2/-	4,000
fixed expenses		1,000 1 wk x Rs. 1000/wk	1,000
		20,000	39,400
Working		20,000	39,400
capital		164,000	312,500
			312,300
Therefore, increa	ase in working capital = .	312,500 - 164,000 = Rs. $148,500$	

14. (i)	WORKING CAPITAL Present	CALCUL	ATION Proposed					
Stock of raw materials Work in progres	4 mths x 10,000 x Rs. 1	Rs. 12 480,000	2 mths x 15,000 x Rs. 8	Rs. 240,000				
Material component		120,000	1 mth x 15,000 x 8	120,000				
Labour component		10,000	½ mth x 15,000 x 3	22,500				
Variable overhead	1 mth x 10,000 x 1	5000	½ mth x 15,000 x 1	7500				
Fixed overhead	½ mth x 40,000 mth	20,000	½ mth x 40,000/mth	20,000				
Finished goods Debtors Cash (ignore)	2 mths. x 10,000 x 22	155,000 Nil 440,000	2 mths x 15,000 x 20	170,000 Nil 600,000				
		1,075,000		1,010,000				
Less Creditors - materials labour variable O/H fixed O/H	1½ mths x 10,000 x 12 ½ mth x 10,000 x 2 1½ mths x 10,000 x 1 1½ mths x 30,000/mth	180,000 10,000 15,000 45,000*	1½ x 15,000 x 8 ½ x 15,000 x 3 1½ x 15,000 x 1 1½ x 30,000/mth*	180,000 22,500 22,500 45,000				
Working capita	1	250,000 825,000		270,000 740,000				
	duction in working capit		Rs. 85,000					
(ii) Working capita as above Less financed	.1	825,000		740,000				
internally: profit in debtors	2 mths x 10,000 x 3	60,000	2 mths x 15,000 x 5½	160,000				
depreciation in debtors depreciation in	2 mths x 10,000/mth	20,000	2 mths x 10,000/mth	20,000				
work in progress	½ mth. x 10,000/mth.	5000	½ mth x 10,000/mth	5000				
	3 3 3 3 3 3	85,000		185,000				
External finance	e	740,000		555,000				
required Therefore, re	eduction in overdraft faci	lity require	d = Rs. 185,000	*				
* Creditors do not include depreciation (Rs. 10,000 per month)								
+ The new	cost structure is as	follows:-						
Lat Var	terials oour riable overhead ed overhead	* *	$ \begin{array}{cccc} & Rs. & 8 \\ & 3 \\ 40,000 \div 15,000 & 2 \\ \hline & 14 \end{array} $	22 3				
Pro			5	3 3				
Sell	ling price	* *	Rs. 20					

CASH FORECAST (Rs.)

Payments	MAY	JUNE	JULY	AUGUST	SEPT.	OCT.	NOV.	DEC.	TOTAL
Purchases Wages Works expenses	10,500	12,525	55,500 13,125 8,880	60,000 9,525 8,160	58,590 13,725 8,820	59,850 12,300 9,000	52,500 12,525 8,520	54,600 11,550 8,040	341,040 95,775 59,940
Administration expenses Payments to CISIR		3,750	4,140	3,720	3,900	3,780	4,050	3,840	27,180
Selling & distributing expenses Machinery Buildings		13,275	12,600	13,950	10,800	12,375	14,790	13,920	91,710 114,000 120,000
Rocainte	10,500	41,670	211,845	158,955	99,435	100,905	155,985	95,550	874,845
Cash sales	132,750	126,000	139,500	108,000	123,750	147,900	139,200	156,600	1,073,700
Net cash flow Cumulative net cash flow	+122,250 + 84,330 +122,250 + 206,580	+ 84,330 + 206,580	- 72,345 + 134,235	-50,955 +83,280	+ 24,315 +107,595	+ 46,995 +154,590	- 16,785 +137,805	+ 61,050 + 198,855	+198,855

No cash is required as the venture finances itself.

16. Statement of Capital Requirements

Fixed Capital:		Rs.	Rs.
Land including fencing			30,000
Buildings, 100,000 sq. ft. @ 12/50 sq. ft		•	1,250,000
Sanitary and electrical fittings Machinery, cif value		. 215,000	8,500
add: 2½% duty		5,375	
add: transport & installat		2,500	
Office furniture and fittings			5,000
Van			15,000
			1,531,375
Working Capital			
Stock of raw material -			
cloth 1 month x 30,000 yds/mth x Re	. 1/- yd .	. 30,000	
solution 3 months x 30,000 gallons/m	th x		
50			
Rs. 50/gallon	REP.	. 90,000	
		120,000	
Stock of finished cloth, debtors, etc.	<u> </u>	. 200,000	-
Total Capital Required			1,851,375
Statement of Profitabili	ty (first	vear)	
Rs.	Rs.	Rs.	Rs. per
NS.	13.	103.	yard
Sales 360,000 yds @ 2/50		900,000	2/50
less variable costs:			
Direct materials – cloth	360,000		1/-
solution	2 (0 000		
7200 @ 50/- Direct labour	360,000	724 400	1/-
	14,400	734,400	
Contribution less fixed costs:		165,600	0/46
Factory overheads			
(excl. depreciation)	10,000		
Depreciation on buildings, 5%	62,500		
Depreciation on machinery 10%	22,287		
	94,787		
Admin. overheads			
(excl. depreciation) 20,000			
Depreciation on furniture &	21.250		
fittings 10% 1,350	21,350		
Van running costs (excl. dep'n.) 7,000	10.000	107 107	0.10.5
Depreciation on van, 20% 3,000		126,137	$\frac{0/35}{0/11}$
Net profit	R	s. <u>39,463</u>	0/11
Profitability on			
above capital 39,463 — 2 1 °/ p	er annum	NOUS.	
${1,851,375} = \frac{2.1\% \text{ p}}{}$	ci amium		
.,,			

220	munug	CHICHI	7100	ountu	ney	111 00	yion				
17. (i) Profit and Loss Budget-Year 2 (Rs. 000)											
Sales Revenue Less Materials Wages V. O/H F. O/H Net profit		21 8.4 4.2	12	2Q 42 21 8.4 4.2 7.5 4	2 2:		25 10	-	93 37 18 .3 30	.2	tal 86 78.8 7.2
	Casl	h Bud	get -	Year	2 (F	Rs. 00	00)				
Sales receipts Less Payments - Materials Wages V. O/H F. O/H Net cash flow Opening overder Closing overder	 Iraft	21.1 8.4 4.2 3.9	12	-2	2 2 1 39	0.2 4.8 3.9 44 -1	25 10 4.4 2.4	+6 -21	37 18 .7 15 5.3	.6 .2 .3 .6 1 +	65.7 11.3 26.2 14.9
(ii)	7	Vorki	ng ca	pital	calcu					21	
Materials stocks Debtors						J	00th une 5. 000 17.0 42.0 59.0)		31st ecem 15. 00 17 51 68	00.00
Less Material cr V. O/H cre F. O/H Working ca Increase in	ditors apital (e:			raft) .		4 3	11.2 47.8	2	3.5 1.7 1.3		.5
	7 7 7	M A 7 7 4 14	M 8.5 14	8.5	J 8.5 17	A 8.5 17	8.5 17	0 8.5 17	N 8.5 17	D 8.5 17	Total 96 14
- Issues		1 21 7	22.5	24 7	25.5 8.5	25.5 8.5	25.5 8.5	25.5 8.5	25.5 8.5	25.5 8.5	110 93
Closing stock 1	4 14 1	4 14	15.5	17	17	17	17	17	17	17	17
	chase) editors	7 7 tors	7		8.5	8.5 9.8 2.7 7.1	3	8.5	8.5	8.5	94.6

18. Traders Ltd. — Sources and Application of Fur			
	Rs.	Rs.	Rs.
Sources- Net profit (net of any dividend)		4163	
Depreciation retained		5400	9563
Application- Purchase of plant and machinery		1710	,,,,,
Increase in working capital:		1/10	
increase in debtors & cash	10,402		
+ increase in raw material stocks	2,250		
+ increase in raw material stocks			
- decrease in WIP and FG stocks	12,652 4,799	7853	9563
19. Source and Application of Funds and Control of the year to March 1967	ash Fio	W	
for the year to March 1967	Rs.	Rs.	D.c.
Omaning avandraft loss balance at bankers fr	K5.	175.	NS.
Opening overdraft, less balance at bankers & cash in hand			21 061
		•	31,861
Deduct sources of funds:		6414	
Profit for the year before tax		3139	
Depreciation retained Increase in liabilities:		3139	
	565		
Future taxation	934	1499	
Dividends payable	734		10.707
Decrease in debtors			19,707
			12,154
Add applications of funds:			
Dividends		3913	
Taxation		798	
Purchase of plant, etc		3392	
Investment in leasehold redemption		0.0	
policy		93	
Increase in stocks		4165	20.205
Decrease in creditors and accruals		7944	20,305
Closing overdraft, less balance at bankers &			22.450
cash in hand		_	32,459
20. (a) M Company Ltd. Working Capital Flow	Statem	ent	
for the year to April 1967			
ELECTRONIC PROPERTY OF PERSONS AND PROPERTY OF		R	s. 000
Opening working capital			84
Add sources of funds:			
Profit for year after tax		19	
Depreciation retained		8	
Issue of mortgage debentures		65	92
Deduct disposals of funds:			1/6
Dividends charged		12	
Purchase of fixed assets	30		
Less sale of fixed assets	13	17	
Redemption of preference shares		25	54
Closing working capital			122
Closing working capital			

Note: (1) The reconstructed Disposal account is as follows:

Cost Profit to P/L a/c	10	Depreciation Cash	3 13
	- 16	The sale of the sa	- 16
	-	Mark Washing	m

- (2) Profit for the year is taken after tax but before preference dividend (which is a disposal of funds), and exclusive of the profit on disposal of assets (which is included in the proceeds of sale of assets).
- (3) A dividend of 10 has been charged against the opening balance on Profit and Loss account. This is a disposal of funds.
- (b) A working capital flow statement shows opening working capital, sources and uses of funds (other than decreases and increases of working capital), and closing working capital.

A quick asset flow statement, by analogy, shows opening quick assets (cash, debtors and prepayments, and liquid securities), sources and uses of funds (other than decreases and increases of quick assets, but including decreases and increases of stocks), and closing quick assets.

A cash flow statement shows opening cash and bank balances, sources and uses of funds (including decreases and increases of stocks and debtors, and increases and decreases of creditors), and closing cash and bank balances.

All are prepared on an accrual accounting basis. The difference lies in the degree of analysis: a cash flow or quick asset flow statement breaks up working capital into its constituent assets and liabilities, so that changes in liquidity are revealed in greater detail.

- (c) The purposes of these statements are broadly similar, as follows:
 - (1) to show the reasons for changes in asset structure during the year, e.g. changes in current ratio, quick assets ratio, fixed assets to current assets ratio,
 - (2) to show the reasons for changes in capital structure during the year, e.g. in the debt/equity ratio,
 - (3) to show the proportion of funds *provided* internally and externally and the proportion *used* internally (i.e. invested) and externally (dividends and capital repayments).
 - (4) to provide an arithmetical check on the accounts (total sources = total uses).

These purposes apply both to *planned* sources and uses and *actual* sources and uses.

SECTION V

FINANCE

5.1 ASSESSING CAPITAL REQUIRED

Section 4 was concerned with financial planning including the planning of cash requirements for fixed assets and working capital. This Section is concerned with *funding*, that is obtaining funds to meet the needs of the business.

The long term cash budget shows :-

- (i) how much cash is required; (Many businesses start undercapitalised and never really recover. It is prudent to add at least 20% to the best estimate of total capital requirements).
- (ii) when funds are required.
- (iii) what funds are required for; (this is important as the assets for which cash is required may be offered as security).
- (iv) in what form they are required i.e. in rupees or foreign exchange.
- and (v) how long they are required e.g. short term or long term, redeemable or irredeemable (permanent), repayable in instalments or in a lump sum.

The essence of financial management is to borrow short term for short term needs, and to borrow long term for long term needs. Short term finance has a lower interest cost than long term finance (in theory but not always in practice) but it would be dangerous for a firm to "borrow short" and then find itself unable to repay due to the money having been put into long term assets. Good finance is a matter of balance, so that money is available for repayment and redemption of debt as it is needed. Usually, therefore, fixed assets and permanent current assets are financed from equity and long term debt; only temporary current assets such as seasonal stock piling are financed from short term debt.

5.2 CAPITAL STRUCTURE AND GEARING

One of the main decisions a company acquiring finance has to make is whether to acquire debt or equity. "Debt" means all forms of loans, overdrafts and debentures carrying the right to payment of a fixed rate of interest irrespective of profits, and to prior repayment of capital in a winding-up. "Equity" means share capital, more particularly ordinary shares which are entitled to dividend only as the directors determine and after all prior charges are met, and similarly rank last for repayment in a winding-up. Preference shares are included as equity in the wider sense.

Debt is cheaper than equity. Debentures for instance are currently (1971) paid 9 – 11% per annum and the interest is an allowable deduction for tax, so that the net cost of this source of capital is about 5% p.a. Ordinary shareholders on the other hand will expect a dividend yield of 10 – 15% p.a. plus capital appreciation. This is also the net cost since it comes out of profit after tax. (Preference shareholders expect 9 – 11% p.a. which is also paid out of profit after tax.)

On any issue of debentures (which are nearly always redeemable debentures), the firm should create a sinking fund for repayment. This may be invested outside the firm in liquid securities, or inside the firm provided it is earmarked and kept in a liquid form so that it can be easily realised when the debentures mature.

On the other hand, too much debt would cause a heavy load of interest which must be paid in bad years as well as good. A company which issues a high proportion of fixed interest debt capital is said to be highly geared. The reason for this expression is that fluctuations in total profit cause even larger fluctuations in equity profit and the multiplier or "gearing" is higher as the proportion of fixed interest capital is higher.

Example		Low geared	High geared
		company	company
		Rs.	Rs.
Ordinary share capital		200,000	100,000
8% Debentures		100,000	200,000
Total capital employed		300,000	300,000
First year		ELL FAIR LE	
Profit before interest		30,000	30,000
Less debenture interest		8,000	16,000
Profit after interest (equity profit)	117.	22,000	14,000
Ordinary dividend payable	* *	11%	14%
Second year			
Profit before interest		15,000	15,000
Less debenture interest		8,000	16,000
Profit after interest (equity profit)		7,000	-1,000
Ordinary dividend payable		3½%	Nil*

^{*}Ordinary dividend is payable only from reserves retained in past years (if any).

Note that a 50% drop in profits reduces equity profits by 70% (15,000 on 22,000) in the low-geared company, but by 107% (15,000 on 14,000) in the high geared company.

Therefore the capital structure should be balanced, so that as much cheap capital is employed as possible without the risk of having to cut the ordinary dividend in a bad year. A company with substantial reserves or having very stable profits, can issue proportionately more debt capital than a company that has just been formed or having profits very susceptible to swings of demand or to competition. The level of gearing considered normal in Ceylon is one of debt to one of equity but this is not by any means an absolute limit. Moreover a company can gear itself more highly if it offers acceptable security and/or pays a higher-than-normal rate of interest. Whether this is safe depends upon its long term cash forecast – the question is whether the company can meet the interest and capital repayment burden even in bad years.

It may be observed that far higher gearing ratios are considered acceptable in Ceylon than in the older industrialised countries. In U.K. for instance 1 of debt to 3 of equity (i.e. a one to four ratio of debt to net tangible assets) is frequently considered the practical limit. Gearing levels in developing countries are probably due to pressure of demand for capital, and the shortage in the supply of risk capital. Also where markets are protected, profits are more stable, thus allowing higher gearing. In Japan, for instance, the banks have supported high gearing ratios and this has contributed to their rapid economic development.

Too little debt capital and too much equity is financially inefficient; it is equivalent to buying materials or other resources from expensive sources. It is profitable to the equity for debentures to be issued provided the profit on the extra capital is more than the interest payable, since the surplus goes into the equity profit. However many family businesses prefer not to resort to debt finance because of the risk of not being able to service the debt in a bad year. In case of default, the trustee for the debenture holders would be entitled to step in and manage the company or sell the mortgaged assets for the benefit of the debenture holders. On the other hand, in normal times debenture holders have no voice in management; a firm may find this a convenient way of raising capital without creating more vote-carrying ordinary shares (which might enable someone else to gain control of the company.)

5.3 REQUIREMENTS OF LENDERS AND INVESTORS

Different types of loan/equity and different institutions have different requirements which must be met by the borrower. These are dealt with in the appropriate sections below.

There are three general requirements:

(i) income, i.e. interest or dividend sufficient to recompense the lender/investor for the risk and illiquidity he is caused.

(ii) security, which may be tangible or intangible. Tangible security means some valuable asset worth more than the amount lent, over which the lender takes rights which are exercisable on any default in payment of interest or repayment of the principal. Alternatively, finance may be provided on the intangible basis that the project has been fully evaluated and is expected to generate returns sufficient to repay the money invested in it. Sometimes the lender will require the management to participate in the project themselves to ensure their personal involvement in its success. Sometimes the lender supervises the end-use of his loan.

Whereas commercial banks normally require tangible security, development banks looks to the viability of the project for their security.

(iii) return of principal, or marketability of the security.

5.4 INTERNAL SOURCES OF FINANCE

Internal sources of finance are as follows:-

(i) retained profit – All profits are represented by assets held by the firm, usually in the form of working capital. Insofar as sole traders or partners do not draw their profits and insofar as a limited company does not pay out its profits as dividends, profits are retained. They may be earmarked to particular purposes, e.g. reserve for increased cost of replacing fixed assets, or be left as non-specific reserves, such as general reserve and balance on profit and loss account.

For most companies, especially small and fast growing companies, retained earnings are an important source of capital funds, since capital issues are either impracticable or are expensive. There is no expense involved in retaining profits. Compare this with paying them out as dividends and then making a rights issue; $33\frac{1}{3}\%$ dividend tax would be lost to the Inland Revenue.

- (ii) depreciation provisions The credit balances on provisions for depreciation are also represented by assets. These are not usually earmarked as depreciation assets (unless the depreciation fund method is used). Like assets from retained earnings, they are available for new investment.
- (iii) sale and lease back If a company owns land or buildings these may be sold to a property or insurance company and simultaneously leased back on a long lease. In effect, the company acquires a capital sum at the expense of the annual rental.

The rental, like debenture interest, is chargeable against profits for tax purposes. If the responsibility for repairs and maintenance passes to the property company, the rental will comprise a reimbursement of these expenses, plus a normal interest charge on the capital funds made free. This is a form of gearing, since the firm takes on additional fixed interest obligations. Before doing so, it should check the effect on its creditworthiness.

The firm must be careful that its tenancy rights will be protected and that the rent is fixed for the period of the lease.

Strictly speaking this is not a source of finance since total capital is not increased; it is merely a switch from one asset to another. At present it is not much used in Ceylon.

(iv) equipment leasing is not so much a source of finance as a way of avoiding the need for finance. Profits arise from using assets rather than necessarily owning them. In the U.S. and U. K. leasing companies have specialised in leasing out industrial plant and equipment at a fixed annual charge. Also some equipment manufacturers provide leasing facilities or can arrange them for a potential customer. The lessee specifies exactly what is required and the lessor provides it usually for a minimum lease period of five years. After five years the rental is usually reduced to a nominal amount. All upkeep and maintenance is the lessee's responsibility.

Rentals are chargeable against profits for tax purposes. This is usually worth more than a lump sum depreciation allowance.

Like sale-and-lease-back, leasing increases the fixed obligations of the firm. For this reason it is called "hidden gearing", or "off the Balance Sheet finance".

The cost tends to be high since the leasing company must cover not only the cost of capital and its administration expenses, but also the risk of obsolescence.

(v) debt factoring is a practice which has recently emerged in the more developed countries whereby an institution purchases a firm's debts at their face value less a discount. As before this is not strictly a source of finance, but merely a release of working capital. It is used especially for export sales customers. The discount takes into account the expected period of credit the debtors will take, the interest cost of capital and the likelihood of bad debts. The factor then manages the sales ledger, collecting the debts on his own account. (To avoid loss of customer goodwill or credit-worthiness, the firm may actually receive customers' cheques itself but immediately turn them over to the factor). The latter has no call on his client unless there is a dispute over the delivery or quality of the goods.

and

5.5 THE CAPITAL MARKET

Capital can be raised by an issue of shares or debentures to the public. The amount that can be raised in a single issue in the Ceylon market at the present time is probably not more than Rs. 2 million to Rs. 4 million. A hotel capitalised at say Rs. 15 million or a large industrial undertaking of anything up to Rs. 100 million would need to find the bulk of its capital from the banks, from the Development Finance Corporation, from foreign collaborators and from its own promoters, before going to the public. The institutional lenders would normally expect a one-to-one debt/equity ratio, and that the promotors would have a controlling interest in the equity.

The Ceylon capital market is not large enough to support issuing houses or a true stock exchange. Advice to companies seeking capital, and facilities for buying and selling securities are provided by members of the Colombo Brokers Association who have share departments in addition to their normal broking business in tea, rubber and other commodities. Member firms of the Colombo Brokers Association in alphabetical order are as follows:—

Bartleet & Company Ltd.
B. E. R. Cooray & Sons.
Forbes & Walker Ltd.
John Keel, Thompson, White Ltd.
Somerville & Company Ltd.

All public issues of industrial companies require prior approval of the Ministry of Planning and the Ministry of Industries, which will examine the project evaluation in detail and may approve subject to

certain conditions e.g. that raw materials and packing materials are obtained locally so as to save foreign exchange. Past experience shows that the process of obtaining approvals is likely to take at least a year.

The first public issue of a company is invariably an issue by prospectus. This is an offer to the public to subscribe for shares which come into existence only after the application lists have been closed, when the board of directors complete the allotment and notify applicants.

The public will not of course subscribe for shares unless they can be sold, if required, on the share market. Therefore, the promoters must apply to the Colombo Brokers Association for a quotation in the official list. The application must meet the requirements of the Colombo Brokers Association By-Laws (see Appendix) which are modelled on those of the London Stock Exchange and are designed to prevent fraudulent issues to an unsuspecting public. These requirements are far in advance of the present company law in Ceylon (which is now 40 years out of date).

No application is considered in respect of any company in which the issued capital is less than Rs. 100,000. A basic requirement is that a reasonable percentage of the issued capital must be made available

to the public, so that there are enough shares to constitute a real market. A minimum percentage would be 15% - 25% depending on the spread of shareholdings.

Equity is more often in the form of ordinary shares. Preference shares are not popular, since their market price falls when interest rates rise. Nor do they have much advantage for the company compared with debentures, since the preference dividend, unlike debenture interest, is not tax deductible. Some institutional lenders such as private pension and provident funds may prefer preference shares, so as to increase the security of their investment income. Preference shares are usually cumulative (i.e. any arrears of preference dividend must be paid before any ordinary dividend can be paid) and redeemable. Articles of Association do not usually allow them voting rights unless the dividend is in arrears. Participating preference shares are rare; these are shares having rights to participate in surplus profit after a certain ordinary dividend has been paid.

Debentures are popular, especially unsecured medium term debt of 5 years, 7 years and 10 years, though debt can be raised for up to 15 or 20 years. Irredeemable debentures are rare. At the time of writing (1971) $9\frac{1}{2} - 10\%$ interest is payable on 10 year secured debentures, and 10 - 12% on unsecured debentures. Secured debentures are less common than unsecured debentures. They would be secured on immovable property rather than by a floating charge. This allows a higher proportion of debt since valuation is more certain. The firm may prefer to issue unsecured debentures so as to preserve its assets as security for further debt in the future (e.g. bank loans); it can sell unsecured debentures provided it has a good earnings record, good prospects, and is not already highly geared. A quotation is not usually sought for debentures as purchasers (e.g. private provident funds) normally hold them to maturity. Debenture stock is sold in block amounts but is usually transferable in minimum units of Rs. 100.

The convertible debenture has become popular in some countries (not yet in Ceylon). This is a hybrid security; it is a fixed interest loan carrying with it the right to convert into equity shares on fixed terms at some future date. This is an attractive two-way option for subscribers; if higher profits materialise it is worth converting; if they fail to materialise the subscriber can continue with his loan.

In any issue of shares or debentures, it is not always necessary to require the entire balance of issue price on allotment. The cash budget may show that only a proportion of the total amount is required immediately, and the balance after a few months. In this case, the amount due on allotment can be fixed accordingly, and the balance can be made payable on calls at predetermined times. This makes it easier for investors to find the money. Usually shares are fully called within 12 months of issue. Shares are not left partly uncalled indefinitely as this constitutes a contingent liability on the holder. (Bank shares are a common exception).

The costs of a public issue are partly fixed and partly variable. The Colombo Brokers Association charges a fee of 1/10th of one per cent of the nominal value of the issue (with a minimum fee of Rs. 250 and maximum fee of Rs. 10,000). Brokers and banks get a brokerage or commission of 1% on applications bearing their stamp. A further 1% on the issued capital is payable as stamp duty. Then there are the costs of printing the prospectus, letters of application, letters of allotment, share certificates, etc., advertising the prospectus, legal fees, brokers' fees and accountants' fees. It is advisable, though not always essential, to have the issue underwritten so that the full amount is assured. Brokers, banks and the Development Finance Corporation of Ceylon are the main institutions which underwrite issues. The underwriting commission is $1\frac{1}{2}$ % of the nominal value of the shares or debentures offered.

Some recent issues and their costs were as follows:-

1	Date of pro	ospectus			Estimated expenses
30 4	February June June March	1970 1969 1969 1969	Lankem Ceylon Ltd. Associated Motorways Ltd. Kandy Textile Industries Ltd Central Finance Co. Ltd.	240,000	285,280

When an existing company wishes to raise further capital, it is usually required by its Articles to offer the new shares or debentures first to the existing share-holders. This is known as a rights issue as the existing share-holders have the pre-emptive right to subscribe for shares in proportion to their existing holdings. Usually the issue price is appreciably lower than the current market price of the existing shares e.g. if ordinary shares are quoted at Rs. 20, a rights issue may be offered at Rs. 14 or Rs. 15. If a shareholder does not want to take up his rights shares, he can sell his rights to someone else. Suppose a company offers shares at Rs. 14 on a 1 for 1 basis. A person holding one share worth Rs. 20 will finish with two shares worth Rs. 34 i.e. the ex-rights price will be Rs. 17 and the rights are worth Rs. 3 per share.

The cost of a rights issue is appreciably less than the cost of a new issue, since no prospectus is necessary and a circular to the shareholders is cheaper than advertising to the public. The Colombo Brokers Association fee is half the normal rate. Stamp duty is still payable, and also underwriting commission if the issue is underwritten.

If an existing company cannot raise further capital from its own shareholders then with the agreement of the company in general meeting, it may make a further public issue by prospectus.

An offer for sale is an offer to the public to purchase shares which are already in existence, and held by the original promoters or major shareholders or an underwriter who has subscribed for the whole of an issue. In Ceylon, the offer for sale is often intended merely to get a quotation for existing shares, e.g. for estate duty purposes or to increase

the marketability of the shares. The Colombo Brokers Association require that a reasonable percentage of the total issued capital be made available. Instead of a prospectus, a document called an "offer for sale" must be prepared and advertised. The requirements are similar to those for an issue by prospectus and the costs are also similar. The directors allot shares on some fair and reasonable basis; a broad-based shareholding is usually preferred to prevent threats to the control of the company.

An introduction is an offer to the public through the market instead of direct. Members of the public may purchase through brokers in the market i.e. the directors do not have control on the allotment of shares. Instead of a prospectus the broker publishes an "Advertised Statement". An introduction is commonly used merely to unload part of the shares so as to get a quotation. A placing is similar; the broker purchases shares and places them with his own clients. Since this limits their marketability, a higher yield must be offered. Small issues are usually placed. They are not underwritten.

The bonus issue (also called scrip issue, or capitalisation issue or stock dividend) is mentioned here for the sake of completeness though it is not a source of finance. It is merely a book-keeping entry, debiting reserves and crediting share capital. The shareholder gets "free" shares in proportion to his existing holding, but the total value of his shares is no higher than before.

This may appear somewhat pointless, but it does have certain advantages:

- (i) the market value of each share is reduced thus making it more marketable;
- (ii) by bringing the capital into line with the net assets employed, the rate of dividend (which is always expressed on the nominal capital) is reduced to a realistic figure.
- (iii) if the firm is contemplating raising a long term loan, and there are substantial revenue reserves, which could in theory be paid out as dividends given sufficient cash, the lenders may be reluctant. Capitalisation removes this deterrent.

Very often a company raises its dividend (as an absolute amount) after a bonus issue. The prospect of this, and the increased marketability of its shares, usually raise the price of its shares on the market. A shareholder can then, if he wants, sell some of his bonus shares, which represent past retained profits, and still maintain his previous dividend.

5.6 EXTERNAL SOURCES - SHORT AND MEDIUM TERM

(i) Commercial banks - loans and overdrafts

Traditionally, the commercial or deposit banks finance short term needs which are self-liquidating. Examples are seed-time to harvest

loans for agriculture, assistance to retailers for stocking up for festival seasons, assistance to contractors to undertake additional contracts and "bridging" loans where more permanent capital is being raised and will be used to repay the bank.

However in recent years banks have gradually lengthened the periods for which they are prepared to provide loans, subject to the borrower's creditworthiness and security, and subject to maintaining overall liquidity ratios which enable them to meet the day-to-day needs of their depositors. For instance the Bank of Ceylon can lend for up to 15 years on the security of immovable property. In developing countries lacking capital resources this is a most important policy as economic development requires greater amounts of medium and long term capital than can easily be channelled through development banks and other such institutions. The Central Bank encourages this by refinancing approved term loans provided for the development of agriculture, industry, trade and commerce i.e. it lends at a low rate of interest to the bank (or other lending institution) for a period between 5 and 15 years.

Equity participation remains outside the functions of deposit banks though some banks are prepared to underwrite equity issues.

Before lending, the bank's Credit Intelligence Department will check the borrower's creditworthiness. This is mainly dependent on size, profitability and reputation for probity and reliability. Some attention is paid to the current ratio for short term loans and to the gearing ratio for long term loans, though audited Balance Sheets tend to be out-of-date for this purpose.

An advagce can be arranged either as an overdraft or as a loan. On an overdraft basis a maximum limit is agreed upon by the borrower and the bank at the outset and the borrower can overdraw upon the current account up to that limit. Thus there will be a fluctuating debit balance on that account and interest will be charged on the daily debit balance. Since interest on overdrafts is charged only on the day to day overdrawn position, bank overdraft facilities are cheaper than bank loans and the most convenient and flexible form of finance.

Overdrafts are legally repayable on demand but the borrower can usually rely on such accommodation being renewed at intervals (unless the government has instructed the banks to restrict credit), since overdrafts are the most remunerative assets in the bank's Balance Sheet. Central Bank permission, renewable every 6 months, is required for loans to foreign-owned companies.

If the advance is given on the basis of a fixed loan, the full amount of the loan is credited to the borrower's current account to be drawn upon as required. Such advances have to be repaid in monthly or quarterly instalments and interest is payable on the total loan granted less instalments repaid, whether or not the funds have been used.

The rate of interest charged on an overdraft or loan depends mainly on the purpose for which it is required and partly on the type of security offered. At the time of writing, $8\frac{1}{2}\%$ per annum is charged on finance for certain approved purposes such as agricultural development, pre-export finance (see export finance below), tourist promotion, tea production, essential imports and normal stock building (i.e. up to three months' retail stocks). 10% is charged on industrial projects and 12% on non-essential imports, speculative stock building, residential property, etc.

Short term finance normally has a lower interest cost than long term finance because there is less risk to the lender that interest rates will rise during the term of the loan. However long term rates are highly influenced by expectations of future rates and may go below short term rates where current high rates are expected to fall in the future. This appears to be the present situation in the Ceylon market where debentures cost about 9% and bank loans about 10%.

Loans may be secured on certain kinds of asset or guaranteed by creditworthy firms or individuals. Slightly higher rates of interest are charged on the latter unsecured loans. The most acceptable security is a mortgage of immovable property. This includes land with good title, buildings on the land, and plant and machinery immovably installed in the buildings. A loan may be granted of up to 60% or exceptionally 70% of the value of the property (as valued by the lender). An equitable mortgage consists of the mere deposit of title deeds with the lender. At times the bank would require a legal mortgage to be executed.

Loans may be obtained on life assurance policies up to 95% of their surrender value. The policy is assigned to the bank, but premiums continue to be paid by the policy-holder.

Stocks and shares of approved public companies quoted on the Colombo share market are readily accepted by banks for loans up to 40% or 50% of their market value. Power of attorney is executed in favour of the bank to deal with the securities so deposited and the companies concerned would be directed to pay all future dividends direct to the bank to the credit of the borrower.

Short-term advances are available from commercial banks on the security of documents of title to stocks of goods which are readily marketable and not quickly perishable. Documents to title are usually:

- (a) Bill of lading the acknowledgement by the owner or master of a ship of the receipt of goods with an undertaking to deliver them to the shipper's agent at a certain port.
- (b) Dock Warrant issued by a warehouse keeper as a receipt for goods deposited, with an undertaking to deliver the goods to the order of the depositor.
- (c) Delivery order Authority to a person or his agent to receive goods lying in a specified warehouse, wharf or dock.

The mortgage of stock is called hypothecation. A loan is given for up to 50% of the market value. The stock remains in the possession of the borrower, but he must insure the stock against normal risks and assign the policy to the bank. If he sells the stock, he must deposit the proceeds with the bank. On a stock mortgage, the bank usually takes the collateral security of a personal guarantee from the borrower or a third party.

If stock is *pledged* this means that the bank takes possession either by placing the stock in its own warehouse, or by fitting its own padlock to the borrower's warehouse or store. A pledge would be taken on imported goods or goods intended for export (see (ii) and (iii) below).

Motor vehicles are also acceptable security for loans (up to 50% of their value).

Hire purchase contracts may be re-financed by commercial banks. This is especially useful to a retailer who sells on instalment credit terms.

Book debts are not normally accepted except sometimes from first class customers of the bank. An overdraft (not a loan) would be allowed up to 40% or 50% of the debts, so that it would be repaid as the debts were realised. (This is an assignment of debts but is not the same as factoring, in which the debtors are instructed to pay direct to the lender).

Floating mortgages over all the assets of an undertaking are not favoured by banks as they are a weaker form of security, but they may be allowed to first class companies as security for an overdraft. This form of security is advantageous to the borrower since it permits him to deal with the assets so secured in the normal course of trade, whereas a fixed charge relates to specific assets which cannot be disposed of without the written consent of the lender.

For agriculturists, livestock and crops may be accepted as security. For instance the Peoples Bank will lend on the security of livestock provided it is insured against death and the policy is assigned in favour of the bank.

Bank loans and overdrafts are a major source of finance, especially for the mass of small private companies which have no access to the new issue market. Small companies depend mainly on private sources, bank loans and finance companies.

(ii) Commercial banks - export finance

When a firm exports goods to a buyer abroad, if it does not arrange finance from a bank it would not receive the sale proceeds until the goods had arrived and been taken over by the buyer. An exporter can get payment for his goods as soon as they are shipped by drawing a bill of exchange on the foreign buyer and discounting the bill with his bank. The bill is discounted before acceptance on production of the shipping documents viz. the invoice, insurance policy, bill of lading and perhaps

a letter of hypothecation. A bill with shipping documents attached is called a documentary bill. The bank sends it airmail to its agent in the importing country and so recovers its advance.

The bank of course will not purchase bills drawn on unknown foreign buyers without some assurance that the bill will be honoured. There are two methods of covering the risk: (a) a commercial letter of credit may be opened by the foreign buyer with a bank in his own country in favour of the seller. A letter of credit is an undertaking by the bank to meet bills drawn in accordance with the terms of the credit. The most favourable form of credit for the exporter is an irrevocable and confirmed credit. Provided he tenders the precise documents called for under the credit, payment is made at once. He tenders the documents to his own bank. The bank pays him, then airmails the documents to its branch or correspondent bank in the importing country for recovery from the bank which has given the letter of credit. If the bill is not "at sight" the latter bank finances the period of the bill (at the importer's expense since he has to meet the bill at maturity).

(b) if the buyer is unwilling to incur the additional expense of establishing a letter of credit, the exporter must arrange for his own bank to make an advance against bills drawn on the buyer. The bank purchases bills within pre-arranged limits depending on the credit-worthiness of the exporter, since by drawing the bill he makes himself liable on it (should the buyer not honour the bill). Usually these are documentary bills as before.

Pre-export finance means loans granted to enable brokers and shippers to purchase goods for export, or to manufacturers to manufacture goods for export i.e. finance before shipment. The security for the loan is the pledge of goods pending shipment. A first class customer may be allowed to give the bank a Trust Receipt, which states that he holds the goods as a trustee for the bank, instead of transferring possession.

(iii) Commercial banks - import finance

The importer requests his bank to open a letter of credit in favour of the exporter by which it undertakes to meet bills drawn by him in strict accordance with the terms of the credit. The bank will require the importer to deposit cash in advance for any margin of finance above the importer's credit limit. If the goods are very saleable the margin is lower.

The importer has to meet the bill at maturity. The bank charges a fee of 1/8th of a per cent for opening the credit and discounting charges which are implied in the rate of exchange. Bills do not usually exceed 180 days.

If the importer cannot retire the bill at maturity, the bank may allow further credit on a pledge of the goods.

(iv) Hire purchase and finance companies

Hire purchase and finance companies and some banks provide finance for purchasing on hire purchase terms durable productive assets such as commercial vehicles, tractors and other agricultural equipment, plant and machinery (rupee loans only). Repayment is made in equal instalments over 24 or 36 months depending on the type of asset.

Finance is provided for both new and second hand assets, but normally only up to 50% or 60% of the market value (as valued by the lender). Interest rates are quoted on the original balance outstanding i.e. the effective rate on the average balance outstanding is rather higher. For instance on equipment costing Rs. 100,000 one major finance company would lend Rs. 60,000 with interest quoted at 12% per annum. This is calculated on the Rs. 60,000. Over a 3 year repayment period, the total interest would be Rs. 7200 x 3 = Rs. 21,600. On an average balance outstanding of Rs. 30,000 the effective rate of interest is 24% per annum. In addition a service charge of 2% of Rs. 60,000 would be payable at the outset. Some companies also levy documentation and stationery charges, stamp fees, legal fees, etc. Usually the hire purchaser must insure the asset in favour of the finance company.

It can be seen that hire purchase finance tends to be expensive, since the finance company has heavy administrative costs and has to bear the risk of default. Even though it takes right of repossession the asset may have been misused and be worth less than the cost less repayments collected.

From the borrower's point of view it is a very convenient way of acquiring use of an asset, provided the asset can be put into productive use immediately and make sufficient earnings to repay instalments. At the end of the hire purchase term, the goods become the property of the hire purchaser (unlike an equipment lease).

Lump sum depreciation allowances are given against the principal part of repayments, and the interest part is a chargeable expense.

Finance companies will also make term loans like banks (but up to 3 years only) on tangible security, or to creditworthy customers on the personal guarantee of promissory notes. Tangible security would be immovable property, stocks (which are transferred to the finance company's own warehouse and released in instalments as repayments are made), life assurance policies, quoted securities, etc. A typical current rate of interest is 14% per annum, charged on the *original* balance outstanding, i.e. an effective rate of about 28% per annum.

(v) Trade creditors

A very important source of credit is the one month's credit often allowed by suppliers of trade goods and services. If no cash discount is offered for prompt payment, the credit is free, though if the firm abuses this facility, credit is likely to be withdrawn, or perhaps separately charged by agreement. If the supplier allows a cash discount for prompt payment it would be expensive to forego this as is usually works out to be much

higher than prevailing interest rates, e.g. 2% discount for payment within 10 days, where the alternative is no discount for payment in, say, a month and 10 days, represents 2% for 1 month or 24% per annum.

Where the firm is in short term difficulty, it will usually be to the suppliers' advantage to allow longer credit, especially where the firm represents a major customer. Special arrangements may then be made. Conversely customers who are dependent on uninterrupted supply may be prepared to pay in advance or provide a loan on the security of a long term supply contract.

(vi) Insurance Corporation

Most of the premiums received by the Insurance Corporation are invested in Government securities, but up to 25% can be used for personal loans on the security of life assurance policies, or to policy-holders for the construction of residential housing on the security of the land. Loans on policies are given up to 90% of the surrender value. Loans for house construction are given up to Rs. 25,000, at present at 11% per annum.

The Employers Provident Fund is not a source of industrial finance as the whole of its funds have to be invested in Government securities.

(vii) Inter Company Loans

Companies with temporary cash surpluses may lend to companies within the group which require temporary finance. This may result in considerable economy to the group.

(viii) Amounts set aside for Income Tax

Income tax on the profits for an accounting year is not payable until assessed. Delay in assessment is in effect free credit though of course the amount is entirely dependent on profits and cannot be planned as a separate source of finance.

If a firm has surplus cash, it can buy Tax Reserve Certificates which carry interest at 3% per annum (tax free), and can be surrendered against the tax liability on the date the tax is due for payment. (See section 5.11).

(ix) Loans from friends and relations

This is an important source of finance for the small business, especially initial finance to get started. It is often at low interest or interest-free or repayable only after a long period. On the other hand, it may carry obligations, e.g. to provide employment for a favoured relative. If the latter proves to be useless, his salary is effectively part of the cost of this source of capital.

5.7 LONG TERM FINANCE - INSTITUTIONAL LENDERS

In addition to the banks and finance companies there are a number of specialist institutions and also the Government which provide capital for certain purposes:

(i) Development Finance Corporation of Ceylon (DFCC)

The DFCC exists to further economic development by making medium and long term loans, with or without tangible security, to private industry and large scale agriculture. It lends only to limited companies in the private sector (more than 20% Government participation is a disqualification). Also it promotes the participation of private capital in approved ventures, e.g. by underwriting share issues, and by selling its own equity holdings.

Loans are given only for capital equipment, not for raw materials or other current expenditure.

The DFCC was established by Act of Parliament in 1955 and commenced business in 1956. Up to June 1970 it had financed 91 projects to a total of Rs. 65m with a further Rs. 42m committed. Losses have occurred in 3 cases, totalling Rs. ½m.

Amount and form of finance

The minimum loan or share investment is Rs. 100,000. The maximum depends on the capital structure of the borrower, and of the DFCC: (i) the borrower's equity/debt ratio should not be less than 1:1.5 or 1:2, depending on the type of industry and its relative stability; also the DFCC will not normally take up more than 25% of a borrower's issued share capital.

(ii) the total of loans, share investment and guarantees on behalf of a single enterprise should not normally exceed 20% of the DFCC's equity (including reserves) and Government loan, nor should the equity content exceed 10% of the same. Aggregate share investments are limited to the DFCC's equity (including reserves), plus Government loan. (The Government loan is subordinated to the equity, i.e. on liquidation it is repayable only after the equity is repaid, so that it counts effectively as equity).

Project evaluation

All projects requiring foreign exchange must be referred to the DFCC from the Ministry of Industries Development Division.

Projects are evaluated by DFCC staff, with outside opinion, estimates and valuation as necessary. The client pays 1% of the loan application against the DFCC's costs in the case of foreign exchange loans and $\frac{1}{2}$ % in the case of rupee loans.

Evaluation is on private sector criteria of profitability, viability, technical soundness, managerial competence etc. Social costs, social benefits and foreign exchange savings form part of the assessment of overall economic feasibility. DFCC does not insist upon a specified minimum return or an element of foreign exchange earnings as do some development banks but it does expect projects to be able to service their debts and make a reasonable profit for the sponsors. Technical and administrative managerial competence is also assessed.

Evaluation takes 1 to 3 months, depending on the size of the project, and the availability of basic information.

Security:

The DFCC's assurance against loss is the viability of the project. Loans, etc. may be made without security. However mortgages on land and buildings, plant and machinery, both fixed and movable, and directors' personal guarantees, are taken to reinforce the borrower's obligation.

For a large equity investment the DFCC may require a seat on the Board, in order to give advice and to protect its investment. However, it prefers not to take part in management.

Terms:

Foreign exchange loans are made at present at $10\frac{1}{2}\%$ p.a. Interest and repayment are made in rupees.

Rupee loans are also at $10\frac{1}{2}\%$. Interest on rupee loans is reduced to $9\frac{1}{2}\%$ where industrial loans are refinanced by the Central Bank (this is done as far as possible).

Repayments may be delayed to allow for the gestation of the project (usually 1 to 2 years). Repayments are made quarterly, half-yearly or annually with fixed instalment of principal and interest on the balance outstanding. The term of the loan is 5-15 years, depending on the project's capacity to repay.

On foreign exchange loans a commitment charge of $1\frac{1}{4}\%$ p.a. is levied on any part of the loan not withdrawn. On any default in repayment, the interest charge is raised from $10\frac{1}{2}\%$ to $12\frac{1}{2}\%$. A premium is payable on any early repayment of foreign exchange loans.

Supervision:

The DFCC exercises continuous follow-up on the use made of finance by means of personal contact and quarterly returns, but without interference to the management of the project. A panel of professional consultants is available to advise borrowers as required.

Finance and pricing:

At March 1970, the DFCC had the following sources of finance:-

	Rs.m	Cost
Capital and Reserves	11	(8% dividend on Rs. 8m issued
		capital
		=5.9% on capital and reserves).
Government Loan	16	Nil
Bank of Ceylon Loan	2 19	$7\frac{1}{2}\%$
Central Bank of Ceylon	19	$6\frac{1}{2}\%$
refinance scheme		
World Bank \$4m first line of		
credit (all committed)	11	7%
World Bank \$8m second line	of	
credit (partly committed, by	ut	
not yet disbursed)	-	7%
I	Rs. 59m	Average 4.7%

On loans outstanding of Rs. 58m, admin. costs were 1.4% and tax took 1.2%. Pricing policy is to add about 3% to the cost of capital.

(ii) Agricultural & Industrial Credit Corporation of Ceylon (AICC)

The AICC was established by the Government in 1943 after 9 years of controversy and delay following the Pochkhanawala Report of 1934. Its purpose was to finance agricultural development and to re-finance the debts of agriculturists, and to aid industrial development. It is to be amalgamated with the State Mortgage Bank. The new institution will be known as the Agricultural Development Bank, and will provide credit for agricultural purposes only.

Currently, about 75% of the loans are made on agricultural property, and only 25% to industry. Most of the loans on agricultural property are for its purchase, or redemption of debt (refinance), comparatively little for development. Loans to industry are about equally divided between redemption of debt, and development. The principal industries assisted are process industries based on tea, rubber, coconut, timber, also mines and quarries, and engineering (few consumer goods industries).

Loans are made to individuals as well as to companies (unlike the DFCC). There is a Colombo office, but no branch offices.

Amount of Loan:

The minimum is Rs. 500, and the maximum Rs. 100,000, unless the loan is eligible for re-finance by the Central Bank.

The loan is also limited by the security offered. Up to 75% of the value of immovable property or 50% of the value of plant and machinery may be lent (usually less).

The average delay in obtaining a loan is about 6 months, mainly because of the difficulties of verifying title and the time taken to register the mortgage.

Security:

Primary mortgage on land with satisfactory title is required (in practice, this means a documentary title without any defect for not less than 40 years, or a lease of the same, with at least 30 years unexpired). Owing to legal restrictions, crops and movables other than motor vehicles are not acceptable. Industrial plant and machinery are acceptable provided they are permanently installed in a building on land both of which are also offered as security.

The AICC pays the costs of getting title deeds, etc. for small borrowers who do in fact get loans.

Property is valued by AICC valuers by reference to current and future income and having regard to the risks incidental to a forced sale; valuation costs have to be met by the borrower.

Like the State Mortgage Bank, the AICC has the right to foreclose without recourse to the courts, but has rarely had to do so. (The value of the security, of course, tends to vary with the market price of its crop; if a borrower defaults because of low market prices, it may be better to allow further time than to foreclose on a depreciated property).

Terms:

Present interest is 9% p.a. on loans for development, and 10% on other loans. Repayment is over 15 years (10 years if the greater part of the security is in plant and machinery). Commencement of repayment may be deferred on suitable development loans. Repayments are made half yearly, or more frequently if the client wishes.

Supervision of Loans:

Inspectors visit properties to ensure that loans are used for their stated purposes, and that the property values are being properly maintained.

The real security for a loan is the borrower's ability to repay instalments as they become due which, in the case of a development loan, depends largely on the expected earnings being realised. The AICC is entitled to take an active part in the affairs of its borrowers in order to ensure the safety of its loans. Quarterly returns of sales, costs, etc. are required from industrial borrowers, but there are not sufficient skilled personnel on its permanent staff to evaluate and supervise projects.

Finance and Pricing Policy:

The AICC has about Rs. 30 million Treasury loan, on which it pays $5\frac{1}{2}\%$. Administration costs are 1.3% of the outstanding loans, and tax takes a further 0.9%, leaving over 1% profit which goes to reserve. (There is no share capital).

Debentures cannot be issued without Treasury approval, which has never been given. Since 1955, no further capital has been provided, therefore loans can be granted only so far as repayments are received.

(iii) Ceylon State Mortgage Bank (SMB)

The SMB was up by Government Ordinance as long ago as 1931. Its original purpose was to grant long term loans for the permanent improvement of agricultural land on the security of the land. Its scope was enlarged to include the granting of loans also for urban housing, and from about 1950 this became the larger side of the SMB's business.

In 1968 the Ordinance was amended. Loans may now be granted for the following purposes:-

- (i) the cultivation, development or improvement of any land used, or to be used, for any purpose of agriculture;
- (ii) the purchase or lease, or the construction, repair or renewal of any building, factory, mill, mine, machinery or equipment used, or to be used, in connection with any agricultural undertaking;

- (iii) the manufacture or preparation of any agricultural product or commodity for sale in the market;
- (iv) the purchase or lease of agricultural property;

 (These applications will be considered only from those who are genuinely interested in purchasing and developing agricultural property).
- (v) the purchase or lease of any land for the construction of a dwelling house;
- (vi) the purchase or lease of a dwelling house;
- (vii) any purpose incidental to the above;
- (viii) the liquidation of any debt already incurred for any of the above.

The SMB also operates special loan schemes. These are separately detailed below.

Amount of Loan:

The maximum is Rs. 1 million for agricultural development, and Rs. 25,000 for any other purpose (no minimum). The loan cannot be more than 75% of the value of the security (in practice most loans are limited further to 50% of the security, on the basis that the value of the security may fall this much). Valuation is made privately by the SMB.

Security:

Primary mortgage on immovable property only. The title to the property must be "satisfactory" (previously title had to meet the very stringent requirements of the legal advisers). The Insurance Corporation is devising a policy to cover against possible defects in title. Property is valued by two independent valuers on the SMB panel. Costs of proving title and of valuation have to be met by the applicant. A charge is made for SMB's costs of examining title.

The SMB has the right to foreclose on property without recourse to a court of law. In 37 years, this has been exercised only 5 times.

Terms:

The interest charged at present is 5 - 11% p.a. depending on the purpose of the loan; loans for development are cheaper than loans for pure purchase. The interest rate is fixed at the start of the loan, and not varied. The interest rate is reduced by 1% if the loan is accepted for re-financing by the Central Bank.

Repayment is over 10 to 25 years, depending on the risk of the security losing its value, e.g. urban property usually is a good risk and warrants a 25 year repayment, coconut land would require a quicker repayment, and rubber land the shortest repayment.

The outstanding principal can be paid off at any time on 3 months' notice.

Special Loan Schemes:

	Eligibility for loan.	Max. loan	Interest	Repay- ment period	Govern- ment subsidy
Development of tea factories.		Rs. 1 million	9½%	15 years	dig of cost of certain items of machinery and dig the interest on the balance of the loan,
Tea replanting	Holders of Tea Repl- anting per- mits issued by Tea Controller from 1969.	Rs. 2000 per acre (max. Rs. 25,000 on intan- gible security).	7% (5% on security of land).	5 years, starting after 6 years' grace.	Rs. 3750 per acre.
Tea diversification	Holders of Crop Diversifica- tion Subsi- dy Permits issued by Tea Con- troller.	Rs. 500 – 1500 per acre depending on crop to be planted (max. Rs. 25,000 on intangible security).	7% (5% on security of land or insurance policies).	4 – 10 years after planting, depen- ding on crop.	Rs. 680 – 1400 per acre depen- ding on crop to be planted.
Export crops other than tea rubber and coconut.	_	Rs. 1 million	9½%	15 years	
Dairy farming		Rs. 250,000 (max. Rs. 10,000 on intangible security).	9½ - 11%	15 years (7-8 years on in- tangible security). Period of grace may be allowed.	Rs. 500/acre
Poultry farming		Rs. 50,000 (max. Rs. 10,000 on intangible security).	9½ - 10½%	15 years (3 years on intangible security). Period of grace may be allowed.	
Pig, goat and sheep farming, and meat processing.	_	Rs. 250,000 (max. Rs. 10,000 on intangible security).	$9\frac{1}{2} - 10\frac{1}{2}\%$	15 years (4 years on intangible security). Period of grace may be allowed.	

Instalments are payable half yearly or monthly, by the fixed instalment method.

If a borrower defaults on an instalment he is required to pay a penalty of 1% of the balance of principal outstanding.

A 1% initial processing charge is made on the amount of the loan.

Supervision of Loans:

Inspectors check that money is used for the correct purpose, and that the value of the security is being maintained.

Finance and Pricing Policy:

The SMB at present obtains funds of Rs. 33 million from 4% debentures (guaranteed by Government) purchased mainly by institutional investors, and Rs. 21 million on a 6% overdraft from the Bank of Ceylon.

Administration costs are about 1% of loans outstanding. No income tax is paid.

The terms above allow the SMB to make a profit of about 1% of loans outstanding. This goes to reserve. (There is no share capital).

(iv) National Development Bank

A National Development Bank is to be established as a wholly-owned subsidiary of the Central Bank. Its chief function will be to provide medium and long term credit for industrial, agricultural and commercial development in the public sector. It will provide a variety of services such as lending, pioneering and promoting, underwriting, management and intermediary loans and technological expertise.

(v) Export - Import Bank

An Export-Import Bank will be founded primarily to service the export of non-traditional goods, especially for those who do not normally have access to the commercial banks. This is directed not so much to the development program, but to facilitate the movement of goods, e.g. by export credit guarantees.

The Bank may also engage in market research itself to assist its clientele in export diversification.

(vi) Government

Apart from tax and duty concessions to certain approved industries (which are outside the scope of this book), the Government also makes grants (subsidies) and/or loans to private enterprises for certain purposes:

Construction and modernisation of tea factories

Since April 1969, the Tea Controller will make a grant of one third of the cost of certain items of machinery (obtainable on a loan from certain banks) and also pay half the interest on the rest of the loan.

Tea replanting

A grant of Rs. 3750 per acre replanted is given.

Tea diversification

A grant is given towards the cost of planting certain crops on former tea land on which tea has become uneconomic. The amount of the grant depends on the crop and ranges from Rs. 680 per acre (pepper) to Rs. 1400 per acre (rubber).

Tea fertiliser

For estates of under 100 acres, the Tea Controller gives a subsidy of Rs. 100 per acre per year. The subsidy is paid in kind.

Rubber fertiliser

A subsidy is proposed for rubber small-holdings and estates of under 100 acres. Fertiliser will be issued at half the cost.

Rubber replanting

The Rubber Controller gives a subsidy of Rs. 1400 per acre (estates over 100 acres) and Rs. 1500 per acre (estates under 100 acres) for replanting rubber.

Coconut fertiliser is also subsidised.

Machinery and machine tools

Until recently the Industrial Development Board (Industrial Credit and Supplies Agency) provided hire purchase and loan finance to industrial firms approved by the Ministry of Industries and to small industrialists approved by the Department of Rural Development and Small Industries. Loans of up to Rs. 75,000 were given on a line of credit from the Indian Government, tied to procurement in India. 7% p.a. interest was charged (i.e. an effective rate of 14% on hire purchase loans) and repayment periods extended up to 7 years. Loans were secured on the guarantee of two income tax payers and the hypothecation of the machinery. Also loans of up to Rs. 2000 were made to small industrialists for the purchase of hand tools from the IDB Technical Services Centre.

The Industrial Credit and Supplies Agency has now been discontinued.

Industrial estates

The Industrial Development Board (Industrial Estates Agency) is developing industrial estates at Ekala, Pallekelle (Kandy), Galle and Jaffna. These are ready-made factories, complete with roads, water, electricity, drainage, etc. available to industrialists at highly subsidised rents.

The main purpose of these estates is regional development. While the siting of a factory should depend on techno-economic factors, the Government influences the economic evaluation of these estates by its subsidised rentals,

Mechanised fishing boats

Loans are available from the Department of Fisheries to practising fishermen through co-operative societies, up to Rs. 30,000 for the purchase of mechanised fishing boats. A deposit of Rs. 1,000 is required and loans are repayable in 60 monthly instalments with interest at 9½% p.a. on the reducing balance.

Agriculture

The Department of Agrarian Services grants medium term and long term loans to cultivators, co-operatives and Cultivation Committees. (The People's Bank provides short term loans). The use of loans is supervised. The Department also subsidises half the cost of fertiliser, operates a subsidised crop insurance scheme and purchases paddy and other crops at prices guaranteed in advance.

Other Government lending institutions

The Loan Board, Local Loans and Development Fund, National Housing Fund and the Ceylon Savings Bank provide personal housing loans only. The Lady Lochore Fund re-finances the debts of Government employees in financial difficulties.

5.8 SOURCES OF FOREIGN EXCHANGE

An enterprise in Ceylon requiring capital goods, raw materials or services from abroad must get foreign exchange approval. The foreign exchange will come either from the Central Bank's pool or from foreign investors in the enterprise. A foreign firm may collaborate directly with a local enterprise, assisting in providing its equity and/or loan finance (see (i) below). Similarly foreign suppliers of capital goods or raw materials may offer loans (suppliers' credits) with which their goods can be purchased (see (ii) below). These sources require the approval of the Foreign Investment Approvals Committee after full evaluation and approval by the appropriate Ministry.

There is also foreign investment in intermediary financial institutions such as development banks and development corporations which use their funds to promote economic development. These can be subdivided as follows:—

- multilateral worldwide e.g. the World Bank (iii) and International Finance Corporation (iv)
- multilateral regional, e.g. the Asian Development Bank (v)
- multilateral local, e.g. the Development Finance Corporation of Ceylon, see section 5.7(i)
- Government bilateral e.g. the Commonwealth Development Corporation (vi). Export-Import Bank (vii). Cooley loans (viii)
- private, e.g. the Commonwealth Development Finance Company Ltd. (ix) and Private Investment Company for Asia (x).

(i) Investment by foreign collaborators

Most developing countries are anxious to attract private foreign investment but at the same time are suspicious of foreign motives and doubtful as to the real development effects.

On the one hand the foreign firm, usually large and multinational, provides valuable foreign exchange capital, managerial and technical know-how (which may be transferred by training locals), patents, export marketing channels, additional local employment, backward linkages through its local purchases and forward linkages through its sales to local enterprises. Like all enterprise it has a "ripple" or multiplier effect on local economic activity.

On the other hand, without adequate control by the host government the foreign exchange leaving the country for raw material imports, and for dividend, interest and royalty payments, may be more than the amount that has come in. The local training may be lacking, inadequate or even inhibiting to personnel development, and the employment of foreign personnel may cause resentment.

The issues are political and sociological as well as economic. The OECD 1969 Review said that private foreign investment "will find a sound basis for effective and sustained operation primarily in areas and forms of activity where it acts as an agent for technological transfer in the widest sense, or where it helps the balance of payments of the developing country and where it is prepared to be fully integrated into the economy of the host country".

A Government White Paper in 1967 favoured private foreign investment on certain conditions, mainly that "progressive transfer of a major part of the ownership to local interests should be possible." The objective was Ceylonisation of both ownership and employment. In 1969 the Business and Industry Advisory Committee of the Organisation for Economic Co-operation and Development, reporting on the Ceylon environment for private foreign capital, emphasised the importance to the investor of a secure framework of well-defined Government policy and suggested the enactment of a Foreign Investment Law.

Advice on the sectors of the economy and areas in which foreign investment is allowed and the necessary approvals, permits and licenses required is provided by the Industrial Development Board. According to the Industrial Development Board (News Digest 7 May 1970), from 1966–1970, 46 foreign firms collaborated with local industry, providing about Rs. 50 million out of a total investment of Rs. 200 million.

(ii) Suppliers' credits

A supplier's credit (also called export credit or contractor finance) is a loan made by a supplier to enable the importing customer to purchase the goods, i.e. a credit sale. This is a very important form of finance which has grown rapidly since governments of export-conscious countries provide the exporter with finance and also insurance against bad debts including political risks (for instance the Export Credits Guarantee

Department, a UK government-sponsored department, which provides insurance cover on a commercial basis). Credits are given for raw materials as well as for capital equipment.

In 1969, imports into Ceylon under suppliers' credits amounted to Rs. 176 million.

The amount of the credit may cover the whole cost of the goods, or a proportion only. The term may run from a few months to 10 years. Suppliers' credits to Ceylon have been mainly for capital equipment to Government Corporations, repayable in instalments over 6 to 10 years, after a grace period of 1 to 2 years (to allow for the gestation of the project). Interest is charged according to contract, usually at commercial rates (currently 5 to 8%). (An apparently subsidised rate of interest or "free" interest is likely to be compensated by a higher price unless the supplier passes on an interest subsidy from his government).

(iii) International Bank for Reconstruction and Development (World Bank)

The World Bank is an autonomous body affiliated to the United Nations. Since the successful rehabilitation of war-torn economies in the 1950's, the prime object of the World Bank has been to assist in world economic development. 99% of its current loans go to the developing countries. Up to June 1969 Ceylon had received loans totalling \$46 million. In particular it assists in economic infra-structure investment such as roads, railways, ports, harbours and irrigation and electric power projects. The Bank also provides technical assistance in the preparation of projects, review of development programs, pre-investment surveys (as in Ceylon 1952 and 1965/7), aid co-ordination, such as the formation of the Aid Ceylon Group of donor countries in 1965, etc.

Amount and form of payment

The Bank provides finance only in the form of loans for specific projects, not equity, and only the foreign exchange capital equipment component of a project. All loans are untied, i.e. the money can be used to purchase machinery, equipment, etc. from any country, wherever the best terms can be obtained, so the loan goes further than a tied loan, which can only be spent in the country providing it.

Loans are provided mainly to Governments and to Government-guaranteed local development banks (such as the Development Finance Corporation of Ceylon – see section 5.7 (i)), but loans may also be made directly to private firms with a guarantee from the Government of the receiving country.

No maximum or minimum amount of loan is laid down though it is unlikely that the World Bank would finance directly any small or medium scale private sector project because of the cost of sending an evaluation team from the headquarters in Washington D.C. The Development Finance Corporation of Ceylon is the appropriate channel for most loans.

Loans are repayable in foreign exchange.

Project evaluation

The Bank assesses each project on its technical merits, its financial merits (judged by discounted cash flow) and on its economic justification within the overall development plan of the country. It has a highly expert staff of engineers, financial analysts, economists, lawyers and area specialists.

Terms:

Since the World Bank obtains most of its funds by issuing bonds in the capital markets of the world it has to pay interest at "hard" or commercial rates and must also charge similar rates on its loans. In 1968/69 most loans were at $6\frac{1}{2}\%$ p.a.

Typical repayment period is 25 years, after 6–10 years' grace. A commitment charge of $\frac{30}{4}$ % p.a. is made on loans committed but not drawn.

(The International Development Association (IDA) is the soft loan sister of the World Bank. It obtains its funds from member-country contributions and makes loans to Governments only, on very concessionary terms e.g. 1% to 3% p.a. repayable over 50 years with an initial 10 years' grace. Projects must however meet World Bank standards of viability.)

(iv) International Finance Corporation (IFC)

The IFC, the third member of the World Bank Group, is of most interest to private enterprise as it lends to private firms without Government guarantee, on both equity and loan terms. Its purpose is to further economic development by encouraging the growth of productive private enterprise in member countries, particularly in the less developed areas.

Most finance has gone to industry (e.g. steel, fertilisers, cement, paper) also mining, tourism and development banks, i.e. the "superstructure" of the economy. The IFC prefers the joint venture form of enterprise in which a multinational company joins with the local firm to combine technical and managerial know-how with local know-how, and to participate in the financing.

Amount and form of finance

In 1969, commitments were made ranging from an equity investment of \$6000 to a commitment of \$22 million of which \$4 million was equity and \$18 million loan.

The IFC also underwrites issues of shares or securities in local capital markets.

IFC participation often serves as a catalyst to stimulate other sources of capital. For every dollar put into a project, a further \$3 or \$4 has come from private sources.

Evaluation is on World Bank criteria.

Security

Most of the IFC's funds come from its own share capital and from re-selling the shares and debentures in its portfolio. It can do this only if they are attractive to private investors. Therefore the climate for private investment in such countries is all-important.

Terms

Over the last few years the average interest rate on loans has been 7.3% i.e. slightly higher than World Bank loans. Maturity has been from 7-15 years.

(v) Asian Development Bank (AsDB)

The AsDB started lending only in 1968. It is a regional development bank like the Inter-American Development Bank (IDB) which provides finance to Latin America, and the African Development Bank (AfDB). Its object is to promote economic development in the ECAFE region, on the same lines as the World Bank, but with greater flexibility in its policies. For instance, loans are not directed mainly to the infrastructure; recently a loan was made to the Ceylon Government for modernising tea factories.

It lends also to the private sector and is prepared to take equity holdings, and to underwrite security issues, as well as make loans. The AsDB has stated that it intends to base its policy on sound financial management and accordingly will finance only profitable projects. The bank aims to make loans available at lower rates of interest than the traditional international institutions; its initial loans (1968) were made at $6\frac{7}{8}\%$ mainly to the more advanced of the developing countries.

Period of repayment is 12-20 years with 2-5 years' grace before repayment instalments start.

(vi) Commonwealth Development Corporation (CDC)

The CDC is a public corporation in the UK coming under the Overseas Development Administration. It works as a commercial organisation, investing its funds in economic development projects that will both increase the wealth of developing countries and yield a reasonable return on the investment. So far it has operated only in Commonwealth countries which achieved independence since 1948 and the remaining dependent territories (i.e. not in Ceylon), but an Act of 1969 enables the CDC to act in other countries also. Up to June 1969 it had invested £125 million, of which 55% was in electric power, water, housing, finance and transport projects, 20% in agriculture, foresting and mining, and 25% in factories, industrial and property development companies, and hotels.

The CDC can provide equity and/or loans to governments, statutory bodies and private firms. It favours particularly joint companies with local entrepreneurs and local capital and, like the IFC, actively draws in other sources of capital. It also provides experienced management for projects and training for local officers.

Similar corporations for stimulating private investment in developing countries have been set up in other countries, e.g. the Netherlands Finance Company for Development Countries, the Danish Industrialisation Fund and the French Caisse Centrale de Cooperation Economique.

(vii) The Export-Import Bank (EIB) is an independent agency of the U.S. Government which lends to government and to the private sector for purchases of capital equipment in the U.S. and to finance exports and imports between the U.S. and other countries. It should not be confused with the proposed Ceylon Export-Import Bank.

Loans are repayable in dollars. Interest rates depend on prevailing U. S. commercial and government rates $(5\frac{1}{2}\%$ in 1966), credit risk, and the period of the loan (e.g. 5-20 years).

The EIB has committed itself to a loan of Rs. 20 million to a Rs. 41 million hotel project for the Ceylon Hotels Corporation.

The Agency for International Development (AID) is a U.S. Government Agency which also makes project loans for economic development. Loans are made to private firms as well as governments and government institutions and are almost always tied to purchases in the U.S. In 1966 the maximum rate of interest was $5\frac{1}{2}\%$ and repayment was over 15-25 years with up to 5 years' initial grace. Repayments are in U.S. dollars.

(viii) PL 480 Local Currency - Cooley loans

When food aid is granted by the United States under Public Law 480, the receiving government must sell the produce and deposit the local currency proceeds in a special account which can only be used for certain purposes. The proceeds are often called "counterpart funds". 10% of the funds are normally reserved by the U. S. Embassy for expenses in the receiving country. The other 90% can be used with U. S. concurrence for economic development loans and grants and other approved purposes.

Up to 25% of PL 480 counterpart funds may be made available for lending to private American enterprise in the receiving country (e.g. U. S. subsidiaries), or to local firms for the import of U. S. agricultural products. These are called Cooley amendment loans.

(ix) Commonwealth Development Finance Company Ltd. (CDFC)

CDFC is a private British enterprise which assists in the financing of productive development in the Commonwealth countries. Up to March 1966 it had commitments of £35 million in 19 countries to 88 development projects, mainly industrial and "agro-industrial" (fertilisers, processing of agricultural products, etc.) and in public utilities.

It lends on commercial terms mainly by debentures and secured loans, and may also participate in equity issues.

CDFC (Ceylon) Ltd. is a recently formed subsidiary of the Commonwealth Development Finance Company Ltd. In 1969 it agreed to make an equity investment of Rs. 2.3 million and a loan of £175,000 to a Rs. 60 million textile mill in Ceylon.

(x) The Private Investment Company for Asia (P.I.C.A.) was established in 1969 with an initial capital of \$17 million provided by industrial and financial concerns in a number of developed economies. It aims to provide equity capital and medium and long term loans for private enterprises in manufacturing, forestry, agriculture, fishing and other industries which have a profitmaking potential and will contribute to the economic development of Asia.

5.9 ACCOUNTING FOR CHANGES IN PRICE LEVELS

One of the most difficult and controversial questions in the accounting field is how to calculate "real profit" and how to maintain "real capital" during an inflation or deflation. The question arises because costs, revenues, assets and liabilities are measured in terms of a "rubber rupee". It is supposed to be a fixed measuring rod but is not. A yard is always a yard, and a ton is always a ton, but the rupee of one year is not the same as the rupee of another year, as its purchasing power changes. At present the long term trend appears to show a continuing fall in purchasing power.

(i) Inflation and pricing

The same inputs cost more rupees as inflation proceeds, so profits fall unless selling prices are also raised.

If all costs rise 10% and the selling price is correspondingly raised 10%, the net profit will also be raised 10%, but this will have the same purchasing power as before, viz.

ss Acc tion	count bef	ore			s Accour	it after
100 20 30	Sales	150	Materials Labour Net Profit	110 22 33	Sales	165
150		150		165		165
	100 20 30	100 Sales 20 30	100 Sales 150 20 30	tion inflation i	tion inflation 100 Sales 150 Materials 110 20 Labour 22 30 Net Profit 33	tion inflation 100 Sales 150 Materials 110 Sales 20 Labour 22 Net Profit 33

In some cases the firm can absorb higher costs, but if the profit is the minimum the shareholders will accept, the directors cannot reduce profits in the long run without prejudicing the future of the firm. The increase in the selling price may of course be delayed, perhaps because the extent of the cost increase is not appreciated until the accounts are prepared, or perhaps because of pressure to restrain prices from customers or the Government. Net profit will then be less than 33. The effect of this is that dividends will have reduced purchasing power. If we assume a single shareholder who is used to getting a dividend of 30,

after prices increase by 10% he will need 33 to maintain his purchasing power. The effect of a delay in raising prices is to redistribute real income from shareholders to customers.

(ii) Inflation and profit

The Profit and Loss account above shows that a profit of 30 increases to a profit of 33 after a 10% inflation (other things being equal). However, during the inflation the profit will be higher because some of the costs, notably the costs of stocks consumed and depreciation, will have been incurred before prices rose. The orthodox accounting treatment is to charge Profit and Loss account with the original cost of material stocks, and a percentage of the original cost of fixed assets, though these costs may have been incurred some time previously and be out of line with the current costs or selling prices. The Profit and Loss account during inflation appears as follows:

Materials Labour Net Profit	100 22 43	Sales	165
	165		165

Net profit is 10 higher than expected purely because materials were purchased earlier, before costs and selling prices increased, and are only now consumed and charged to the Profit and Loss account.

N.B. – The expression "materials" here includes both stocks consumed and the depreciation instalments representing consumption of fixed assets; for the purposes of this section they are both "storable" costs and can be treated in the same way.

It has been argued at least since the late 19th century and strongly since the 1940s that the real profit is not 43, but 33, since the capital locked up in materials now has to be replaced. Having used up 100 of materials and retained 100 out of revenue, the firm is faced with the problem of replacing those materials (since the firm must go on). The replacement cost is now 110, against 100 retained. The proponents of this theory argue that the real profit should be calculated after charging the 10 required to maintain the opening capital (i.e the part of it locked up in stocks and fixed assets). If the extra 10 is not charged, the profit will be a fictitious or inflated profit.

This has five important consequences:

(i) Tax is charged on the monetary profit (43) including the inflationary element. This consequence has caused perhaps the greatest volume of protest against the historical cost doctrine. Businessmen argue that the Government is taking not just a share of their profit but a share of their capital also. An alternative interpretation would be that the "real" percentage of tax on profits is higher than the nominal percentage.

- (ii) If the whole of the monetary profit is distributed as dividend to shareholders, the replacement of stocks and fixed asset capacity will require additional finance. To put it another way, part of the real capital is distributed to shareholders. This may be avoided by appropriating part of the profit (10 in this case) to a reserve for increased replacement costs, before considering what dividend to pay, as recommended by the Institute of Chartered Accountants (England and Wales). (Recommendation N 15, May 1952).
- (iii) We have assumed above that *prices* were increased as soon as cash costs increased. However if prices are based on accrual costs (as they frequently are), there is a delay in raising prices, and profits will not be sufficient to maintain the profit margin.
- (iv) Wage negotiations are often based on reported profits. If profits are inflated the negotiations will not be correctly based. Moreover wage rises based on inflated profit figures reinforce the process of inflation.
- (v) The return on capital will appear to be highest in firms charging stocks and depreciation on assets bought at lowest price levels; these are commonly the firms using the oldest plant and equipment.

(iii) Adjustment of accounts for price level changes

The method recommended by the Association of American Accountants (1957 & 1951) and the Institute of Certified Public Accountants (US) (1963) is known as the *index method*. This is not a departure from historical cost, but a re-statement of historical costs in current money terms by applying an index of general purchasing power, such as a consumer price index. The index is applied comprehensively to all items in the final accounts, not just to stocks and depreciation consumed. It is recommended for supplementary statements; the final accounts are still prepared in conventional monetary terms to avoid misunderstanding.

A simple example follows:

Balanc	e Sheet a	t start of business	
Capital Long term liabilities	100 100 200	Fixed assets and stocks Debtors and cash, minus creditors	140 60 200
Profit as	nd Loss	Account for year 1	
Stocks and depreciation consumed Labour Net Profit	100 22 43	Sales	165
	165		165

Balance Sheet at end of year 1

	The same of the sa		
Capital	100	Fixed assets and stocks	40
Revenue reserve	43	Debtors and cash	
	-	minus creditors	
	143	(60+165-22)	203
Long term liabilities	100		
	243		243
	243		275

We will assume that the consumer price index at the beginning of the year was 100 and at the end of the year increased to 110. Also for simplicity, that all the sales revenue was realised, and all the wage payments made, at the end of the year.

The adjustment to the Balance Sheet following inflation is as follows (for deflation the entries are reversed):

Credit Capital Reserve with increase in the price level index on opening capital and reserves from the date of their creation to the date of the Balance Sheet $(10/100 \times 100 = 10)$.

Credit Capital Reserve with increase in price level on long term liabilities insofar as these are not discharged during the year, i.e. real profit on creditors not yet realised and therefore held in capital reserve (10/100 x 100=10).

Debit Fixed Assets) with increase in price level on fixed assets and Debit Stocks stocks in Balance Sheet from their respective dates of acquisition to the date of the Balance Sheet (10/100 x 40=4).

Debit Revenue Reserve with the difference (20 - 4 = 16).

The net adjustment to the Profit and Loss account is a debit of 16. This can be analysed and adjusted on the Profit and Loss account as follows:

Debit increase in price level index on fixed assets and stocks consumed in the Profit and Loss account from the date of acquisition to the date of consumption. $10/100 \times 100 = 10$.

Debit increase in price level index on debtors and cash (less creditors) on which we make a loss of purchasing power.

$$\frac{10}{100}$$
 x 60 (balance throughout year)=6

The adjusted accounts appear as follows:

Real Profit & Loss Account for year 1

year rupees) 165
1/5
165
1
nd stocks 44
cash 203
ors)
247
a

- Note 1. Fixed assets and stocks are not revalued at 44. Their market value at the end of year 1 may be more or less than 44, which is merely the historical cost restated in current rupees by reference to a general price index. The increase of 4 is credited to capital reserve in order to maintain the purchasing power of capital; it does not represent profit.
- 2. When long term liabilities are discharged the firm realises a real profit since it repays in rupees of lower purchasing power. The profit is the increase in the price level index from the date of raising the liability to the date of its discharge, and is transferred from Capital Reserve to the credit of Profit and Loss account as a separate item.

Advantages of the index method are as follows:

- (i) Once the index is chosen, it is a strictly objective procedure and leaves no discretion to firms to manipulate their profits.
- (ii) It applies to the whole of a business, not just fixed assets and stocks.
- (iii) It conforms with the ordinary concept of profit as the difference between realised revenue and the actual costs incurred to achieve that revenue.
- (iv) It does not mix unlike rupees in a single account (N.B. rupees of 1963 are as different from rupees of 1970 as Ceylon rupees are from Indian rupees).

(v) It shows the real profit of the firm which it is safe to distribute while still maintaining the purchasing power of its capital.

- (vi) It shows whether prices are covering current costs and losses in purchasing power.
- (vii) Wage negotiations may be based on real profit not monetary profit.
- (viii) It raises important ethical and legal issues as to whether there should be legal recognition of changes in purchasing power affecting rights and obligations expressed in monetary terms, insofar as monetary authorities fail to stabilise the currency unit.

Disadvantages are :-

- (i) There may not be any satisfactory index of the general price level, or of the purchasing power of the currency unit.
- (ii) Since it reveals clearly the advantages of having high creditors and low debtors etc. during an inflation, it will raise the demand for credit during an inflation thus worsening the situation.
- (iii) The method is new and not widely understood.
- (iv) There are a number of technical points on which general agreement has not been reached, e.g. what is meant exactly by "realisation" of profits and losses on monetary liabilities and assets?
- (v) The extra work involved.
- (vi) It maintains only the *general* purchasing power of capital, not the purchasing power over the particular assets used by the firm; if the prices of these assets rise more than the general price level, additional capital is required for replacement.
- (vii) It is not accepted by the Inland Revenue as a basis for charging income tax.
- (viii) The Institute of Chartered Accountants (England and Wales) does not recommend the index method "unless and until it becomes a practicable alternative" to historical costs.

(iv) Current value theory

There are a number of alternative proposals to the index method. They are all departures from the historical cost doctrine, and have not been recommended by any of the leading accountancy bodies.

The current value method charges stocks of materials consumed, and depreciation on fixed assets, at their current values at the time of consumption. Current values are current replacement costs by reference to market prices at the time of consumption.

For raw materials or stock in trade, the manufacturing or trading account is debited with the current value, stock account is credited with the historic cost, and the excess of current value over historic cost is credited to a capital reserve (i.e. a reserve not intended for distribution) called Reserve for Increased Costs of Replacing Stock.

The LIFO (last in, first out) method of charging stock issues is an approximation to the current value method. In a period of rising prices, the charge is based on the price at which the last purchase was made which is usually nearer the market price at the time of issue than the historic price at which the stock was purchased (per the specific price, FIFO, or average method). NIFO (next in, first out) is intended to approximate even more closely to the market price at the date of issue. LIFO is allowed in the U.S. as a tax concession (it reduces apparent profits), but not in other countries.

Depreciation is calculated each year as a fixed percentage of the current value of the fixed assets held at the end of the year. This is debited to profit and less account. The credit is split between Provision for Depreciation (which contains only "normal" depreciation based on historic cost), and Reserve for Increased Costs of Replacing Fixed Assets (a capital reserve) for the "excess" depreciation.

A feature of the current value method is that the Provision and Reserve taken together will not be sufficient to replace assets if prices continue to rise. If an asset of life 2 years is purchased for 100, and has a current market value of 110 at the end of its first year, the provision is credited with 50 and the reserve is credited with 5, total 55. If the price continues to rise, say to 120 at the end of the second year, the charge for depreciation is 60, credited 50 to provision and 10 to reserve. The cumulative balances on the provision (100) and reserve (15) are insufficient for replacement (120). Opinion differs on whether the shortage (5) should be an additional charge against profit in year 2, or an appropriation from profit.

The current value method reduces apparent profit during inflation, but reduces it by reference to specific asset prices, rather than the general price level. There is a fundamental objection to this since it would prevent any business showing a profit out of holding materials while their prices rose on the market. This is an inseparable part of the profit-making function. If a business purchases stock for 100, holds it until the end of the year, then sells it for 150, what is its real profit? If the original price level index has risen, say, from 100 to 110, the opening stock is adjusted to 110, and the real profit is 40 (150 – 110). The current value method would charge 150 as the cost, and conclude that profit was nil.

It is sometimes argued that capital should be maintained by reference to its purchasing power over particular assets, usually the particular bag of assets held by the firm at the time. However, this asset mix is constantly changing as the firm must adapt to changing factor prices (materials and services) and product prices. The current value method by contrast adapts profits so as to eliminate the profit on materials.

"... the difference between the cost of an article and its current value may often result from market fluctuations in the prices of particular goods (rather) than from any general trend in the purchasing power of money. Such market fluctuations are an ordinary business hazard affecting profit or loss and their incidence on a particular business may be dependent to a considerable extent upon judgment in buying and on management generally, whereas under the current value method the effect of these fluctuations would be excluded in computing profits" (Institute of Chartered Accountants (England and Wales)).

An alternative concept of maintaining capital is that it is the productive capacity of the assets that must be maintained. For instance, if original capital were sufficient for a plant having a capacity of 20,000 tons/year, should the business not ensure that this capacity is maintained before describing the surplus as profit? Consider the situation in a rapidly developing technology such as petrochemicals. The cost of a plant of given capacity may well fall as the rate of technological improvement outweighs the rate of increase of costs. If depreciation were based on this falling cost, the original cost of the plant would not be recovered. Secondly, most businesses make not one product, but a variety. The mix of products changes in response to outside costs and prices. In these circumstances, productive capacity has no definite meaning.

A third argument is that it is the earning power of capital that must be maintained. Naturally every business would like to maintain and increase the earning power of its capital, but the concept of earning power is even more difficult to use in the objective determination of profits. The earning power of original capital depends not only on the particular mix of assets in which it is invested, but also on methods of manufacture, degree of utilisation of assets, cost of labour and other associated resources, and the market for the product, not to mention the management skills and techniques used in co-ordinating all these into a system that generates earnings.

Real profit is purchasing power available for distribution to shareholders, not to the firm (even though the shareholders may allow the firm to retain part of their profits). Similarly capital is purchasing power provided by shareholders. The firm is under no obligation to replace its consumed assets by similar assets, even if identically similar assets were available. In fact, it should rather be seeking to find new assets (and services) which it can convert to relatively high-priced products. If the firm above decided to replace its assets with similar assets, it would require additional capital of 40, but this is reasonable since it is moving into a more highly capitalised business in the expectation (presumably) of higher profits.

Other disadvantages of the current value method are:

(i) for many stocks and fixed assets, the markets are inadequate to provide single objective prices (or specific price indexes) at the time of consumption; profits would become more a matter of personal opinion than they already are.

- (ii) in times of falling prices, a part of the cost of stocks consumed and assets disposed of would remain on the books.
- (iii) if prices continue to rise, additional sums (charges or appropriations) are necessary to accumulate to the cost of replacing assets; towards the end of an asset's life this can cause big fluctuations in the profits available for distribution.
- (iv) real profits and losses on monetary liabilities and assets are ignored.

In some European countries businesses have been allowed (for tax purposes) to write up their fixed assets in accordance with a legally established index, and then to charge depreciation on the written-up amounts. The respective assets are debited with the increase in the index, and capital reserve credited.

This is an application of the current value method to depreciation only, and suffers from the same logical defects noted above.

Writing up fixed assets and crediting capital reserve without tampering with depreciation and profit has more to recommend it. Balance Sheets are still believed to be statements of value or worth by the ordinary man in the street, even after 70 years' agreement amongst accountants that they are merely statements of unexpired cost. This popular misconception has led many shareholders to undervalue their shares, and allowed take-over bidders to make unwarranted capital profits on increased asset values. If fixed assets were shown at their current market values (or at an index approximation), the Balance Sheet would be more informative and useful.

However, the original cost of such assets, an essential figure for depreciation and profit purposes, might be lost to view. For this reason, the Institute of Chartered Accountants (England and Wales) recommends that fixed assets should not be written up except in special circumstances (such as the acquisition of a subsidiary, or where subscriptions for new capital are invited on the basis of a current valuation of assets).

(v) Replacement cost theory

The replacement cost method charges depreciation on fixed assets, based not on historic cost or current cost, but on the expected future cost of replacing the assets. The depreciation charge consists of a fixed percentage on historic cost, and an additional percentage for the excess of expected future cost over historic cost. The former is credited to Provision account in the ordinary way, and the excess depreciation is credited to Capital Reserve for Increased Replacement Costs. The result is the same as the Institute recommendation N 15 except that the excess depreciation is charged to profit rather than appropriated from profit.

Note that changes in the expected future cost result in fluctuating depreciation charges. As with the current value method a price increase late in the asset's life can have a big impact on the net profit for that year.

This method reduces the apparent profit during an inflation but, like the current value method, reduces it by reference to specific asset prices rather than by reference to the general price level. Thus the same objections apply.

The replacement cost is even more a matter of opinion than the current value, since it is a future estimate and not a current fact. The business must estimate:

- (i) what assets will be replaced;
- (ii) when they will be replaced;
- (iii) what assets will be purchased to replace them (assets are not usually replaced with identically the same assets, as newer models become available, new methods of production are adopted etc.)
- (iv) what the prices of those assets will be at that time;
- (v) what part of the price represents true replacement, as distinct from improvement.

Estimates (i) to (iv) must of course be made by any business as part of its long term planning to ensure adequate finance. However, profit is determined by reference to past transactions, not future transactions.

Example:

The following question was set in the Institute of Chartered Accountants of Ceylon Final Examination, December 1969:

The summarised Balance Sheets of Alpha and Beta at 30th September, 1968, and 30th September 1969 were as follows:

Plant-at cost Less depreciation	30.9.68 Rs. 20,000	30.9.69 Rs. 20,000 2,000	Capital: Alpha Beta	30.9.68 Rs. 30,000 30,000	30.9.69 Rs. 30,000 30,000
	20,000	18,000	Profit Creditors	5,000	25,000 5,000
Freehold Land and Buildings at cost – 31st March					,,,,,,
1969 Stocks – 2,000		12,000			
Units	20,000	35,000			
Debtors and Cash	25,000	25,000		-	
	65,000	90,000		65,000	90,000

You are informed that:

(i) Depreciation on plant is calculated on the straight line basis over an estimated life of 10 years,

No depreciation is charged in the year of purchase.

- (ii) Stocks are valued for accounting purposes on the FIFO basis.
- (iii) The rupee which had been stable in the year ended 30th September, 1968, lost purchasing power in the year ended 30th September, 1969, as is revealed by the following general index numbers:
 Year ended 30th September, 1968 All months 100
 Year ended 30th September, 1969 31st December, 1968 125
 31st March, 1969 150
 30th June, 1969 175
 30th September, 1969 200
- (iv) Operations took place at an even rate during the year ended 30th September, 1969 and may be assumed to have taken place on average at index 150.
- (v) Debtors, creditors and cash averaged the amounts reflected in the Balance Sheets throughout the year.
- (vi) Closing stocks had been purchased at the average price ruling at 30th June, 1969.

You are required to prepare:

- (i) a statement adjusting to the average price level the profit of Rs. 25,000 for the year ended 30th September, 1969.
- (ii) summarised Balance Sheets at 30th September, 1969, based on:
 - (a) the general index at 30th September, 1968, and
 - (b) the general index at 30th September, 1969.

Suggested solution:

(i)	Money profit for year to 9/69 Deduct inflationary element:	Rs.	Rs. 25,000
	(a) depreciation converted to average price level = $2000 \times \frac{150}{100} =$	3,000	
	Less depreciation as charged	2,000	1,000
	(b) opening stock converted to average price level = $20,000 \times \frac{150}{100} =$ Less charged	30,000 20,000	24,000 10,000 14,000
	(c) closing stock converted to average price level = $35,000 \times \frac{150}{175}$ = Less credited	30,000 35,000	5,000

(ii)		a		marised	Balance S	Summarised Balance Sheet at 30/9/69					
		of 30/9/68		in Rupees of 30/9/69				in J in 3	in Rupees I in 30/9/68 of	Rupees of 30/9/69	
Plant Less depreciation	::	20,000	94	40,000 C 4,000	Capital –	A B			30,000	60,000	
Freehold land and buildings	ngs	18,000	163	36,000 16,000 P	Profit/loss		i		60,000 1 + 6,000	120,000	
Stocks Debtors and cash	::	29,000	25	40,000 25,000 C	Creditors				66,000 1 5,000	112,000 5,000	
		71,000	117	117,000					71,000 1	117,000	
	Monetary	Worki in Rupees of 9/68	Working notes: Profit upees in Ave: in Rupees 9/68 Rupees of 9/69	1 7 5	and Loss	Profit and Loss Account for year Rupees 9/69	NAME OF THE OWNER, OWNE	Monetary	in Rupees	in Rupees in Ave: in Rupees of 9/69	n Rupees of 9/69
Opening Stock	20,000	20,000		40,000					(001)	(OCI)	(700)
Depreciation	2,000	2,000	3,000	4,000	Sales less	Sales less money costs	:	12,000	8,000		16,000
Loss on net monetary assets Net profit	25,000	6,000	10,000	20,000	Closing stock Net loss	tock	: :	35,000	20,000	30,000	8,000
	47,000	28,000	43,000	64,000				47,000	28,000	43,000	64,000

(d) loss on average net monetary assets held during year (cash plus debtors minus creditors)

$$20,000 \times \frac{50}{100} = 10,000$$
True loss for year in terms of average price level 1,000

Note to student:

1. To convert the profit and loss account into rupees at the average price level of 150, each item is divided by the index at the time it was paid or received, and multiplied by 150.

A loss is made on debtors and cash since claims in fixed monetary terms lose purchasing power. This real loss is partially offset by a real profit on creditors.

The net profit in rupees of index 150 is then the residual balance.

2. The Balance Sheet is similarly converted by taking physical assets and capital, dividing by the index at the date of acquisition, and multiplying by the index at the date of the Balance Sheet (or at any other date required).

Monetary assets and liabilities do not change.

3. The index method usually uses the price level index at the end of the year only. This problem is designed to test the student's understanding that accounts can be converted into rupees of any desired price level, such as average rupees for the year, or rupees at the beginning of the year.

5.10 DIVIDEND POLICY

How much dividend should a firm pay out of its divisible profits, and how much should be retained (ploughed back) for maintenance of capital during inflation, modernisation of equipment, future expansion, etc.? In theory, the whole of the profits after tax, interest and any preference dividend belong to the equity. Sole traders and partnerships will decide for themselves how much to draw and how much to leave in the business. A limited liability company, however, is run by directors as agents of the shareholders and usually the Articles of Association provide that no dividend is payable except on the recommendation of the directors. The following factors must be taken into consideration:—

(i) what rate of dividend is expected by shareholders, having regard to dividend yields obtainable in other companies at comparable risk? If the dividend does not at least match competing offers, in the long run shareholders will switch to more favourable investments, the share price will fall and it will become very difficult to attract new capital.

(ii) what rate of dividend has been paid in the past? Usually a firm tries to stabilise its dividend, or at least avoid cutting the rate, for the sake of shareholder relations and confidence in the company. In a bad year, this may require drawing from reserves.

- (iii) do shareholders prefer high dividends or high capital appreciation? Profits retained add to the net assets of the company and in theory, increase the market value of its shares. If a shareholder sells his shares, he realises the retained profits in the form of capital gains, on which the tax may be less than on equivalent dividends. On the other hand, the dividend distribution has a big impact on the market price of shares; a low dividend may reduce the price despite high retention. This may be counteracted by capitalising reserves and making bonus issues. These of course do not reduce the funds at the disposal of the company but tend to maintain the market value of the company's shares (in total), since individual shareholders who find the dividend inadequate can sell their bonus shares.
- (iv) what are the future capital needs of the firm, and how will they be financed? It is cheaper to retain profits for future capital needs than to distribute them and then later go to the market for capital, for two reasons (a) further tax is paid on dividend distributions and (b) the cost of a capital issue (even a rights issue to existing shareholders) may be 5-15% of the amount raised.
- (v) is cash available, and will the firm be sufficiently liquid after paying the dividend? High profits do not imply large cash balances for two reasons (a) profit is "realised" at the point of sale, i.e. on invoicing, not on receipt of cash, so profits may be locked up in debtors, and (b) even after cash is received it may be reinvested in stocks or other non-liquid assets.

If no profits are made, no dividends can be paid. However, it is possible for a new company to pay *interest* to its shareholders during the gestation (construction) period, with the sanction of the Court (Companies Ordinance, section 55).

5.11 INVESTMENT OF SURPLUS FUNDS

A good cash forecast will reveal what cash will be available to the company and for what period of time. Often it is found that the net cash flow is positive each month except for particular months in which tax, dividends, capital expenditure or other large and irregular payments fall. Provided adequate cash is retained to meet possible shortfalls in revenue and excesses in expenditure, temporary surpluses can be invested. It is not always necessary to carry large and unremunerative bank balances against possible contingencies, if these can be met by realising investments.

Permanent surpluses should be returned to shareholders, either as normal dividends or, if the directors prefer, as a special or capital dividend. (In the U.S. companies can purchase their own shares in the market but this is not allowed in Ceylon).

If a company has issued debentures which must be redeemed at maturity, it will usually set up a sinking fund to do this. A sinking fund consists of an easily realisable security, or portfolio of securities. Each year a fixed amount is invested and added to the portfolio so that, with dividends and interest added in, it will accumulate to the sum required at the time required. It is usual also to appropriate from profit the same sum to the credit of a sinking fund account so that the profit available for dividend is reduced. On maturity the securities are sold, the debenture holders are repaid from the proceeds and the sinking fund balance becomes a capital reserve.

A sinking fund may of course be set up for any future payment. It is a device by which the savings year by year are kept in a separate pigeon hole. (See also the sinking fund method of providing for the replacement of assets). Its only disadvantage is that money invested outside the company is unlikely to yield as high a return as an investment within the company. However the latter may not be easily realisable when cash is needed.

In choosing an investment for a sinking fund, or for funds temporarily in surplus, considerations include:-

- (i) risk. If the investment is a Government security, or Government-guaranteed, both payment of interest and repayment of the principal are guaranteed and the only risk is that of inflation. If the investment is in the private sector, shareholders' funds would not normally be committed without tangible security. It must be remembered that companies taking deposits are not bound by the legal requirements of disclosure applying to invitations to subscribe for shares or debentures; depositors at present have no statutory protection;
- (ii) accessibility. Where a deposit is for a fixed term it may not be realisable before the end of that term. Often there is an interest penalty for premature withdrawal. Even if deposits are withdrawable, it is also necessary to check the notice of withdrawal required, and how long in practice does it take to realise the cash, particularly outstation;
- (iii) return. This is the effective rate of interest per annum. Note that in some cases interest is tax free up to a certain limit. The effective rate is the compound rate of interest on the average balance outstanding. In complicated schemes of investment, it may be necessary to calculate this by discounted cash flow;
- (iv) other conditions, such as the minimum amount accepted.

Some different types of investment are scheduled opposite.

Note that the proposed National Savings Bank will amalgamate the functions of the Ceylon Savings Bank, the Post Office Savings Bank, and the National Savings Movement.

Institution	Type of Investment	Min. Investm. Rs.	Term	Effective Rate of Interest per annum	Interest Exempt from Income ta	Notice of Withdrawal	Security	Notes
Post Office	Savings Bank Deposit	1	None	7.2%	Yes		Government guaranteed	Interest calculated monthly. Withdrawa at any Post Office.
	Ceylon Saving Certificates	5	10 yrs.	4.1%	On first Rs. 15,000	None	Government guaranteed	Interest upto date of encashment on sliding scale, e.g. 2.4% for encashment after 1 year.
Ceylon Savings Bank	Personal Account (Savings Deposit)	5	None	7%	On first Rs. 15,000 investment	140, 00 000,	Sovernment uaranteed	Interest calculated monthly on minimum balance Withdrawal at Head Office or any Kachcheri Withdrawal over Rs. 50 requires attestation
	Fixed Deposit	10,000	1 yr.	7½%	On first Rs. 15,000 investment	+ do -	- do -	Interest reduced for premature with-drawal
Central Bank - Dept. of Public Debt	Tax Reserve Certificates	100	None	3%	Yes	None if surrendered against tax liability. Encashment subject to clerical	- do -	Interest allowed only if surrendered against tax liability.
	Treasury Bills	1,000	3 months	4.8%	No	delays. None	- do -	Bill can be resold to a commercial bank at a loss of $\frac{1}{8}\%$ interest.
	Government Loans (new issues)		10-12 yrs.	9%	No	None. Can be sold in the market	- do -	Since issues and redemption are at par, the effective yield is the nominal or coupon rate of interest.
Market	Government loans (incl. State Mortgage Bank & Nationa Housing deben- tures) (existing issues)	al	upto 5 yrs. 5-10 yrs. 10-15 yrs. 15-25 yrs.	5.25-7.5% 7.6-9.2 9.2-9.5 9.5-10.0	No	None. Can be sold in the market	- do -	Effective rates quoted are redemption yields based on current prices.
	Saving Deposit	5	None	4½%	No	None	None	Min. initial investmen
Banks	Fixed Deposit	500 5000 25,000	3-12 months 13-24 " 25-36 " 37-48 " 3-12 " 13-24 " 25-36 " 37-48 " 3-12 "	4½% 5½% 5½% 5½% 5½% 5½% 5½% 5½%	No	None Fach Deposit matures at the end of the period for which it is placed e.g. 3 months, 12 months	None	Rs. 20. Each deposit is treated separately and not aggregated with others. Fixed deposits can be withdrawn after 1 month, and then get only 3½% interest (4½% to Government Departments
	Tington .		13-24 ,, 25-36 ,, 37-48 ,,	51%	and the			and Corporations).
	Seven Day Deposits	25,000	None	41%	No	7 days	None	Interest payable monthly, and at
Mercantile Credit Ltd.	Time Deposit	500	None	7%	No	3 months	None	Interest calculated monthly; payable only after 3 months'
	Term Deposit	500	2 yrs.	10%	No	No withdrawal before end of	None	notice. 10% simple interest interest can be with-
	Fixed Deposit	500	3 yrs.	10.0%	No	Rs. 1000 in emergency)	None	drawn monthly. 11% simple interest; interest paid only at maturity (effective
			5 yrs.	9.9%	No		None	rate is compound rate 12% simple interest; - do -
Finance Co., Ltd.	Term Deposits	1000	Per notice of with- drawal	3% 5% 8% 10% 12%	No	1 month 3 months 6 months 12 months 24 months	None	Interest calculated and paid monthly. Deposits withdrawabl at Company's discretion - 1% penalty
Market	Ordinary and preference shares, and company	Round quantity	None on ordinary shares or non-redeem- able prefer-	Ordinary shares, div. yield 10-15% Preference 9-11%	No, excep approved industries & hotels which are	quoted shares have a ready market; unquoted shares		
			ence shares	Debentures 9-11%	free of all taxes for first 5 yrs. Hotels at			

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5.12 ASSET VALUATION (INCLUDING BUSINESSES, GOODWILL AND SHARES)

For various purposes it is necessary to know the value of an asset to the firm owning it, e.g.

- (i) for insurance purposes
- (ii) to know whether it is worth selling the asset, or at what price it should be sold or transferred
- (iii) for measuring return on capital employed

The book value of a fixed asset is not really a value at all, but merely the balance of cost not yet written off. This depends on the method of depreciation used. There is a wide variety of acceptable methods such as straight line, reducing instalment, sinking fund, machine hour rate, etc. etc. each of which results in a different pattern of depreciation, and a different book value of the asset at any point in time. It has been agreed as a working convention of accountancy that any of the basic methods of depreciation may be used provided it is used consistently. Therefore the net book value of an asset shown in the Balance Sheet is not expected to reflect, even approximately, the value of the asset to the firm. This is justified by the fact that fixed assets are not normally held for sale, but for the sake of their future earnings (at least until the future earnings have diminished to less than the scrap value of the asset – at this point the asset should be sold – see (iv) below).

The value of an asset is the loss to the firm if it did not have the asset. This loss depends on what the firm would do in the circumstances. For valuation purposes it is deemed to do whatever would minimise the loss:

- (i) if the asset has only just been purchased the present value of its net earnings would exceed the cost. So if the firm suddenly lost the asset, it would presumably replace it. The loss in this case is the replacement cost of an identical asset, plus installation costs, plus any loss of earnings pending replacement. The total represents the value of a just-purchased asset, and this is the value that should be insured initially.
- (ii) during most of the working life of the asset, the present value of its remaining earnings are above the sale value of the asset (assuming the existence of a second-hand market). If the firm did not have the asset, it must be presumed to purchase a replacement of the same age and condition. Therefore the loss is the replacement cost of an identical second-hand asset, plus installation costs, and loss of earnings pending replacement. This is the value of the existing asset.
- (iii) if there is no second-hand market, what would the firm do? If the present value of future earnings of a new asset exceeded its cost it would replace with a new asset. It may of course prefer to purchase a new asset whether or not there is a second

hand market. Or it may purchase an improved asset or even an entirely different kind of asset whichever appears most profitable on evaluation. The loss to the firm in any of these cases is the difference between the present value of the cash flows on the replacement asset and the present value of the cash flows that would have been received from the old asset. If the asset is not yet due for replacement, the cost of a replacement would not be offset by its extra earnings and there would be a real loss. This loss is the measure of the value of the existing asset.

This formula explains why the value of an asset goes down when an improved model comes onto the market. In effect, the loss to the firm by the disappearance of its asset would be less because the cost of the replacement is offset by the saving in operating costs (or higher earnings) that it offers.

An example will make this clearer. A firm with a 10% cost of capital has a lorry which is expected to last 3 years and generate net earnings of Rs. 8000 a year. A new lorry would cost Rs. 50,000 and generate Rs. 10,000 a year for 10 years. These alternatives have different lives, so it is necessary to make the further assumption that each alternative will be followed by a succession of replacements to infinity, thus providing a common time horizon for comparison.

The value of the present lorry is then the present value of the series:

Year 1 2 3
$$4-12$$
 13 $14-22$ 23 $+8000$ $+8000$ $+10,000$ $+10,000$ $+10,000$ $+10,000$ etc.

minus the present value of the series:

Year 0
$$1-9$$
 10 $11-19$ 20 $21-29$ $+10,000$ $+10,000$ $+10,000$ $+10,000$ $+10,000$ etc.

The new machine has a net present value of 11,450 (10,000 x 6.145 -50,000). The second series is equivalent to a receipt of 11,450 immediately and recurring every 10 years. The formula for this is $\frac{A(1+r)^k}{(1+r)^{k-1}}$ where A is 11,450 and k is the interval at which it occurs (10 years). This gives a present value of 18,630 to the second series.

The first series consists of 8000 a year for 3 years, plus the second series delayed by 3 years. This gives (2.487 x 8000) + (0.751 x 18,630) = 33,887.

The value of the present lorry is 33,887 - 18,630 = Rs. 15,257.

When this value reaches nil, it means that the present value of the replacement asset is higher than the present value of the existing asset, and the time has come to replace.

(iv) if the asset would not be replaced at all, this implies that the present value of its remaining earnings are less than its scrap value, and that no other asset shows a present value above cost. The loss to the firm in this case is the scrap value, net of any selling and disposal expenses.

It can be seen that the value of the asset to the firm depends entirely on (i) what the firm will do with it and (ii) on what the firm would do if it did not have it. Both these factors lie in the future and are there fore matters of opinion. The value thus derived is subjective: different directors might place different values on the same asset. Therefore this basis of valuation would not be acceptable to the auditors for depreciation and Balance Sheet purposes. However this valuation enters into every economic decision e.g. whether to purchase the asset, whether to sell it and if so, at what price, whether to replace the asset or retain it longer, whether to scrap the asset, etc.

One practical difficulty is that it is not always possible to say what earnings are attributable to a single asset, since assets are often employed in combination. In this case it is possible to calculate the value of the combination of assets, but any apportionment of this over individual assets is notional.

(i) Valuation of a business as a going concern:

The value of a business as a going concern is the value of the assets it owns, minus the liabilities, plus the personnel, organisation, trading contacts, customer goodwill and every other advantage and disadvantage attaching to the firm. This may be required for assessing the price to be paid for its shares in a merger, amalgamation or take-over or for putting a price on its shares for a minority shareholding.

The value of a business is the discounted present value of its future earnings. If S Ltd. expects a net profit after tax of Rs. 20,000 a year indefinitely, and the potential investor in S's shares has a cost of capital of 10% per annum, its value is the same as an annuity of Rs. 20,000 a 20,000

year in perpetuity with interest at 10% p.a. i. e. $\frac{20,000}{0.10}$ = Rs. 200,000.

(Normally, of course, a profit forecast will show different profits each year, for a limited number of years. The value of the firm is still the discounted present value of such profits). Profits should be taken net of interest; this results in the *equity* value of the company, i.e. the value of its ordinary shares. If this is divided by the number of shares, the result is the value per share for minority shareholdings. (This is known as the earnings yield basis of valuation – see share valuation below).

A majority shareholding is worth more per share because it carries the right to control the company. (In fact, control can often be secured with less than 50% of the vote-carrying shares as it would be difficult to organise opposition, e.g. control may be maintainable with only 30% of the issued ordinary shares if the other 70% are widely dispersed). Control is worth extra because it carries the right to appoint directors and through them to appoint managers and to control the trading policy

of the company. For instance the firm may buy and sell from other firms under the same control. (The directors are trustees in relation to the company and must act bona fide in what they consider to be the best interests of the company, i.e. of all its shareholders, but in practice there is a wide area in which other interests may be benefitted without detriment to their own company).

A similar situation arises where a majority shareholding is sought by a company (H Ltd.) intending to integrate its operations with that of the firm taken over (S Ltd.). In this case there are usually prospective economies of scale, savings in advertising, pooling of research and development, acquisition of technical and managerial skills of the employees and other advantages, offset by disadvantages such as surplus assets, labour troubles, etc. The value of the equity capital is in this case the present value of the incremental earnings, i.e. the combined earnings of H Ltd. + S Ltd. after integration, minus the earnings of H Ltd. on its own.

Dividing by the number of shares issued gives the maximum price per share that should be offered for the outstanding shares.

(ii) Valuation of goodwill:

Goodwill consists of the intangible advantages of a business which enable it to earn a higher-than-normal profit, such as good management, reputation, high employee morale, low absenteeism, good contacts and relations with suppliers, customers, government departments, labour unions, etc. It may also arise by monopoly – absence of effective local competition – perhaps by lack of entrepreneurs, or by the difficulties of obtaining capital, equipment, raw materials, personnel, etc. All of the above factors vary from time to time, and may disappear. (In theory, monopolies are supposed to be temporary but particularly in developing countries they may be temporary for quite a long time).

The value of goodwill is therefore the present value of such "super-profits".

Example:

S Ltd. expects a net profit after tax of Rs. 20,000 a year indefinitely. It has tangible assets valued at Rs. 150,000. A normal rate of return, by reference to companies in the same trade and undergoing similar levels of risk, is 10% net of tax. Normal profits are therefore 10% x 150,000 = 15,000. Super profits are Rs. 5000/year (20,000 - 15,000).

Since this level of profit is expected indefinitely, the value of goodwill is the capital value of an annuity of Rs. 5000 in perpetuity, with interest at 10%, i.e. $\frac{5000}{0.10}$ or Rs. 50,000.

It should be noted that the value of goodwill is the difference between the value of the firm (Rs. 200,000) and the value placed on the tangible assets (Rs. 150,000). In fact, good will is not a separate saleable asset,

but merely the enhancement in value of the tangible assets organised as a going concern. Separately the tangible assets could be sold for Rs. 150,000. Together they are worth Rs. 200,000.

Goodwill valuations often assume conservatively that super profits will last only a few years. "Three years' purchase" or "five years' purchase" of super-profits are common bases. Suppose, in the above example, that S Ltd. is expected (by the valuer) to make super-profits of Rs. 5000/year for 5 years only. The present value of this is the capital value of a terminable annuity for 5 years with interest at 10%, i.e.

$$\frac{5000}{1.10} + \frac{5000}{1.10^2} + \frac{5000}{1.10^3} + \frac{5000}{1.10^4} + \frac{5000}{1.10^6}$$

which comes to Rs. 18,954. Goodwill is therefore valued at Rs. 19,000. If the same profit assumption were made in valuing the total firm, the result would be Rs. 169,000 i.e. Rs. 150,000 tangible assets plus Rs. 19,000 goodwill.

Sometimes, for simplicity, the super-profits are not discounted to their present value. "Five years' purchase" would then be Rs. 25,000 (5 x 5000).

The main difficulty in valuing goodwill, as in all asset valuation, is establishing the expected future profits. Past profits, adjusted if necessary for excess remuneration to directors, special or non-recurring items, etc. are taken as a basis for projecting future profits, For a sole trader or partnership, super profits are calculated after charging a reasonable remuneration for their services as managers.

If a business makes a profit lower than normal, it has "badwill".

(iii) Valuation of shares and stocks

If shares or stocks are quoted and the market is active and well-informed there is no valuation problem since the market price (the mid-point of buying and selling prices) represents a fair valuation.

For unquoted shares, or if the market is inactive, there are three bases of valuation – by earnings yield, by dividend yield, and by assets.

*This means the ratio of net profit per share to share price in other (quoted) firms in the same industry at similar evels of risk. This may be increased by a quarter to a half for the lower marketability of the share being valued (higher yield means a lower share value).

Value of ordinary share (dividend yield basis) = expected maintainable x nominal value x 100 dividend percentage normal dividend yield percentage*

*"Normal" dividend yield is the ratio of dividend per share to share price in other (quoted) firms in the same industry at the same level of risk. As before, this yield may be increased to reflect the lower marketability and value of unquoted shares.

Preference shares may be similarly valued on a dividend yield basis. The value of a preference share is higher than its nominal value if the rate of dividend is higher than the yield on preference shares in similar companies, and vice versa.

It will be seen that the above formulas represent the capitalisation of future equity earnings and of future dividends respectively. Both formulas give the same valuation if the firm's ratio of equity earnings to dividend (called "dividend cover") is the same as in the "normal" firm or the average of the industry. If the firm expects Rs. 10,000/year equity profit and will distribute an annual dividend of 10% on 50,000 ordinary shares of Re. 1/- each, its dividend is Rs. 5000 and the dividend cover is 2 (10,000 \div 5000). Suppose the normal earnings yield is $12\frac{1}{2}\%$ and the normal dividend yield is $6\frac{1}{4}\%$. Then the value of a share (earnings yield basis) = $\frac{10,000}{50,000} \times \frac{100}{12\frac{1}{2}} = \text{Rs. } 1/60$,

and on a dividend yield basis =
$$\frac{10\% \text{ x Re. } 1/-\text{ x } 100}{6\frac{1}{4}}$$
 = Rs. 1/60.

If a firm has dividend cover higher or lower than normal, the valuations differ.

A high dividend cover implies a higher valuation on an earnings yield basis and vice versa. The valuer then has to decide which is more important for his valuation, earnings or dividend. If shares are to be held for their capital appreciation, an earnings yield valuation is more appropriate. If shares are held for current income, a dividend yield valuation would be preferred.

It can be seen that earnings yield and dividend yield valuations assume that the respective earnings or dividend will be maintained indefinitely i.e. an annuity in perpetuity. This may not be very realistic. On the one hand, the firm may be a pioneer, currently earning superprofits. These would not be maintained if and when competition developed. On the other hand the firm may be expanding, and steadily improving its profits. To get a realistic valuation of shares, it may be better to get the best possible forecast of future profits, as they are expected to occur year by year, and to sum their present values (discounting at the "normal" yield).

The assets or net assets basis of valuation is sometimes called "breakup value" as it assumes the liquidation of the business.

Value of ordinary share

(net assets basis)

expected realisation of all assets on a piecemeal sale, less liabilities and prior claims

number of shares

Each asset is taken at its separate realisable value, i.e. proceeds less selling expenses. Goodwill has no value on a winding-up since super-profits, if any, are at an end; similarly patents and trademarks usually have no value (unless they are being taken over by another firm at a price).

The assets valuation sets a lower limit to the value of a share. A dividend yield or earnings yield valuation should be higher, as assets are worth more when organised as a going concern than when sold separately. Therefore, if a business is a going concern, a yield valuation would show the true share value; the assets valuation would be made merely to check that the yield valuation is higher. If the assets valuation is higher, it implies that the business is not worth carrying on; it would be better to realise the assets and invest the proceeds in the "normal" or average firm elsewhere.

If goodwill is added in to a net assets valuation, then the latter is the same as an earnings yield valuation (if goodwill is defined as the difference between the present value of the going concern and the break up value of its assets).

Example

Balance sheet

Share Capital: 1,000 Ordinary Shares of Rs. 10/– Reserves	10,000 190,000	Fixed assets and current assets less current liabilities, at separate market values (any profit or loss on book values taken to reserves)	200,000
Rs.	200,000	Rs.	200,000

If expected earnings per share are Rs. 24/- per year and the normal earnings yield is 8%, value per share $=\frac{24}{8} \times 100 = \text{Rs. } 300$.

Therefore, value of all shares = (value of whole business as a going concern) = 300 x 1000 = Rs. 300,000

But market values of net assets = 200,000

Therefore, unrecorded goodwill = 100,000

If Rs. 100,000 is added into a net assets valuation, we get the same value per share as on the earnings yield basis:

$$\frac{200,000 \text{ realisable assets } + 100,000 \text{ goodwill}}{1000 \text{ shares}} = \text{Rs. } 300/-$$

If a business holds shares, e.g. in a subsidiary, these should be valued first on the above principles and then included in the valuation of the holding company's shares.

Complete example:

AB Ltd. Balance Sheet @ 31st December, 1969

Share Capital 8% Preference shares	Rs.	Premises, less depre-	Rs. 140,000
of Re. 1/-	50,000	Plant, less depreciation	
Ordinary shares of Re. 1/-	20,000	Stock	80,000
Table a resolvenierich Massen		Debtors	40,000
	70,000	Cash at Bank	30,000
Reserves	60,000		
Profit & Loss A/c.	60,000		
	190,000		
6% Debentures (secured)	100,000		
Sundry creditors	80,000		
	370,000		370,000

The profits for the last 3 years (after debenture interest) have been: 1967.. Rs. 55,000; 1968.. Rs. 70,000; 1969.. Rs. 58,000. The Ordinary dividend for each of these years was 150%. Dividend yield in similar companies is 12% on ordinary shares with the same degree of cover, and 7% on preference shares. The latter have no voting rights unless the dividend is in arrear, and no right to participate in any surplus on winding up.

The premises were recently valued at Rs. 200,000 but were not written up in the books.

Ignore taxation.

What is a fair price (i) for the preference shares and (ii) for the ordinary shares?

Answer:

(i) On a dividend yield basis, the preference shares are worth $\frac{8\%}{7\%}$ x Re. 1/- = Rs. 1/14.

On a break-up basis, the preference shareholder would get Re. 1/- only, but this is not a determining factor as the firm appears healthy.

Recommended price: Rs. 1/14

(ii) On a dividend yield basis, we must first forecast future dividends. Profits for the past 3 years have fluctuated but show no distinct trend. In the absence of further information, it may be assumed that the future profits will average Rs. 61,000/year, as in the past, of which Rs. 57,000 is available to the ordinary shareholders. Also we may assume a stable dividend policy, and the same proportion of profits retained. Then, a share is worth:

$$\frac{150\% \text{ x Re. } 1/-}{12} \text{ x } 100 = \text{Rs. } 12/50$$

On an earnings yield basis we will get the same valuation, as the cover in this firm $\left\{\frac{57,000}{30,000}\right\}$ is the same as in similar companies.

Check with net assets basis, assuming that premises would sell for Rs. 200,000 and other assets and liabilities are realised at their book values. Value per share

$$= (370,000 + 60,000 - 80,000 - 100,000 - 50,000) \div 20,000 =$$
Rs. $10/-$.

Whether Rs. 12/50 is a fair value, or whether it should be reduced a bit towards Rs. 10/- depends on the expectation of profits and dividends above. If the Rs. 30,000 dividend can be maintained despite the possibility of future competition and lower profits (Rs. 30,000 is 15% on the net assets compared with 12% elsewhere), then Rs. 12/50 is a fair valuation.

Recommended price: Rs. 12/50

5.13 AMALGAMATION AND OTHER FORMS OF COMBINATION

Amalgamation means bringing the assets and liabilities of two (or more) firms under common ownership and control. In essence one firm purchases another by purchasing its assets directly or (more usually) by acquiring a controlling shareholding. Usually employees are also retained, i.e. a complete organisation is acquired. Amalgamation is also called merger, consolidation, absorption, combination or take-over. The last term is especially used when the directors of the firm absorbed contest the purchase.

The term used by economists is integration. Basically there are three types of integration.

- 1. Horizontal integration means combination with a firm in the same line of business. The advantages of this are as follows:-
 - (i) economies of scale, such as discounts on bulk purchases and cheaper finance from the capital market. If operations are physically merged, fixed overheads are spread over a larger volume of production and sale. For instance production

may be concentrated in the most suitable plant and other units closed down; plants may be automated and data processing computerised; two separate administrations can be reduced to one; selling and distribution facilities can similarly be integrated and surplus facilities disposed of; the greater size of the combination makes research and development more economic.

- (ii) greater competitive strength, e.g. to compete in export markets, by reducing unit costs as well as by eliminating competing firms.
- (iii) the firm can build on its strong points and remedy its weaknesses by carefully selecting the firm with which it will combine, e.g. if a firm's production management is good but it has little marketing expertise, it should seek a firm with a well-established marketing organisation. The total profit potential after the merger should be more than the sum of the individual firms' profits. This is known as "synergy" or the "2 + 2 = 5 principle".
- (iv) amalgamation (or the mere prospect of being taken over) shakes up a lethargic management, revitalises the company, releases unused and uneconomic assets, and improves efficiency and return on capital.
- 2. Vertical integration means combination with a supplier ("backward integration" e.g. a furniture manufacturer with a timber contractor), or with a customer ("forward integration", e.g. a foundry with an engineering firm or a garment manufacturer with a chain of retail shops).

The advantages are as follows:

- (i) backward integration protects the firm's source of supply, enables quality control to be extended back through the supplier's operations and ensures reliable supply at reasonable cost. (Other firms may continue to be supplied at a profit).
- (ii) forward integration protects access to the firm's market, enables the firm's quality standards to be preserved through the customer's operations (i.e. the next phase of manufacture, or the final distribution to retail customers, as the case may be) and increases the firm's control over its selling prices.
- (iii) some economies of scale are possible, e.g. on finance and administration (though not usually on purchase or production).
- 3. Diversifying integration is combination with a firm in an entirely different line of business. In this case operations remain separate; they are not physically combined or fitted together in series. The object of diversification is to reduce the overall risk level, i.e. not to have all the eggs in one basket. For example, a textile firm may take a major shareholding in, say, a food processing firm, so that if raw cotton became unobtainable, the food side of the business

could be built up as an alternative source of profit. Ideally a diversifying merger should be a hedge, i.e. if one business declines the other may be expected to do well.

There may be economies of scale in finance and administration, especially if the seasonal fluctuations of each company do not coincide, i.e. if amalgamation smooths out peaks and troughs of activity.

There are also non-economic reasons for amalgamation. If an owner-manager is about to retire he may seek to sell the company and use the proceeds so as to reduce estate duty. It must also be said that some company purchases are promoted more for personal aggrandisement than for the economic benefit of shareholders.

The disadvantages of all forms of integration or ama amation are as follows:-

- (i) possible abuse of monopoly power. Reduction in competition may lead to exploitation of the customers. In the U. S. A. antitrust legislation severely restricts large scale amalgamations, especially the horizontal kind. In the U.K. a Monopolies Commission and Restrictive Practices Court examine mergers to determine whether they are in the public interest;
- (ii) personnel redundancy, where there are economies of scale in labour and managerial costs. In an unemployment situation this is a public disadvantage, and may also be a private tragedy. Even where labour can be re-deployed there are problems of re-training, union agreements, etc. At the top level, the directors and senior management cannot be duplicated (except under the holding company method see below), therefore some will be dismissed; compensation may be payable under service agreements.
- (iii) an alternative to amalgamation is natural growth to the same size; this is more stable and controllable than amalgamation.
- (iv) if a firm amalgamates in order to acquire another's patents, technical know-how, trademarks, etc. this part of the cost appears as goodwill, on which no tax allowances are given; if on the other hand it develops its own patents, etc. the research and development expense is tax-deductible.

Method: There are five legal forms of amalgamation :-

(i) one company purchases a controlling shareholding in another, and so can replace its board of directors and control policy. This is called the "holding company" form of amalgamation. (Strictly a holding company is one that holds more than half the equity or controls the composition of the board of directors of its subsidiary. A controlling shareholding is not necessarily a majority shareholding (over 50%); sometimes de facto control

at general meetings may be secured with 30% or less of the voting shares if the remaining shares are widely spread among many small shareholders).

With the holding company method each company continues to exist separately, maintaining separate books of account, etc. Therefore, it is not possible with this method to merge the assets physically and work them in combination; it is least suitable for horizontal amalgamation and most suitable for diversifying amalgamation. (Often companies are worked as though they were operating divisions of a single company).

On the other hand, each company retains its individuality and goodwill; it also retains any debenture capital or other cheap finance; also any tax losses (which might be lost on liquidation) may be carried forward.

Since no new company is formed and no company liquidated the method is relatively cheap and simple.

- (ii) a new company is formed to purchase controlling shareholdings in both (or all) companies. This is also a "holding company" scheme and has similar advantages and disadvantages. A new company is sometimes preferred, despite the costs of formation and of an equity issue, since it starts with no liabilities.
- (iii) one company purchases all the shares in the other, which then goes into liquidation. This form of amalgamation is usually called an absorption or merger. It is more complete than the holding company method and is suitable for horizontal mergers. It is necessary to purchase all the ordinary shares; if at least 90% are purchased, section 153 of the Companies Ordinance allows the dissenting remainder to be purchased compulsorily at the same price.

Compared with the holding company method, there can be no problem of minority shareholding interests. Liquidation implies that all liabilities must be paid off, including any debenture capital, so this method loses any cheap capitalisation. Employees' contracts of service automatically discontinue and must be remade.

- (iv) a new company is formed to purchase all the shares of the existing firms, which then go into liquidation. This is most often called consolidation. It may be preferred where firms are of about equal size, to avoid the implications of superiority and inferiority which arise in an absorption. As in (ii) above a new company provides an opportunity to frame a new constitution (Memorandum and Articles), and to start with a clean Balance Sheet i.e. free of liabilities.
 - (v) direct purchase of another company's assets is simple and can be used selectively, i.e. it is possible to purchase a part only of the undertaking such as a division or plant or shop or

other unit. It is also possible to avoid taking over any liabilities or contingent liabilities which may prove a headache. The selling company can reinvest the proceeds or wind up, as it prefers.

Most amalgamations arise out of negotiation and agreement between the respective boards of directors. They then call general meetings, present the scheme to their shareholders, and recommend acceptance.

A take – over bid should be proposed first to the board of the company to be merged. This is recommended by the Issuing Houses Association (U. K.) (see "Revised Notes on Company Amalgamations and Mergers"). However, take-over bids have also been made by circularising the shareholders directly, without prior consultation with the directors.

Since each subsidiary retains its limited liability, the parent company is protected from legal actions or other contingent liabilities arising from the subsidiary's business; creditors of a subsidiary have no claims on the assets of the holding company.

A subsidiary (as legally defined) cannot hold shares in its holding company, but under present company law is allowed to lend "upstream". This reduces the creditors' security and is liable to abuse.

If a subsidiary has any debt capital, the consolidated Balance Sheet will show a higher gearing ratio than the parent company. This is called "pyramiding". South African mining groups have used this device to control operating assets with a very small proportion of the total voting capital, e.g. H Ltd. uses its assets to purchase a controlling shareholding in S 1 Ltd., which uses its assets to purchase a controlling shareholding in S 2 Ltd., and so on. The last company is the operating company. Small variations in its profits cause very big variations in the dividends received by H. Ltd.

The holding company method is often used as a sort of "trial marriage". If the two companies prove compatible, full absorption or consolidation can come later; if the scheme does not work, the holding company may sell its shareholdings.

There is no interruption to the contracts of service with the existing employees.

Purchase consideration

In each of the above methods, the company making the purchase may offer cash or shares in itself in payment. To make the offer attractive, both cash and shares are usually offered though this depends on the offeror's cash position. The combined value of these should exceed the market price at the time of the offer. For instance, if shares in B Ltd. are quoted at Rs. 10/- and shares in A Ltd. at Rs. 4/-, A Ltd. may offer two of its own shares and Rs. 5/- cash, total value Rs. 13/- for each share in B Ltd. This provides an inducement to the shareholders in B Ltd. to sell their shares to A Ltd., and not to hold onto them (which

might frustrate the entire scheme). The maximum price that A Ltd., would be willing to offer depends on its estimate of the capital value of the extra profits resulting from the acquisition. The same price should be given to all accepting shareholders.

In a negotiated amalgamation, the market prices of shares might not be accepted as representing their true values. In this case, both businesses would be valued by capitalising their expected income streams (see section 5.12) and these values would be used to determine the basis of share allotment. Naturally, the same method of valuation must be used for both companies. Suppose in the above case, that the equity in A Ltd., (100,000 shares) was valued at Rs. 500,000, i.e. Rs. 5/- per share, and similarly, shares in B Ltd., at Rs. 8/- per share. Then, a fair basis of allotment would be 8 shares in A Ltd., for every 5 shares in B Ltd., (assuming no cash element in the consideration).

Preference shares or debentures may be allotted instead of (or in addition to) ordinary shares. Where one or both companies has considerable goodwill or other intangible assets which would not be realised in a winding up, the other companies might object that they were contributing relatively more tangible assets. To adjust for this, preference shares may be issued for tangible assets, and ordinary shares for intangible assets.

Under certain conditions, the issue of shares in A Ltd. is exempt from stamp duty.

Ethics of take-overs

Basically a take-over is a purchase of assets by someone who thinks he can run them better.

If a company is not profitable under its present management, the directors should not use company money to maintain their own position and deny the shareholders (and the economy as a whole) the benefits of a change in management.

Directors are trustees for the company and must act bona fide in what they believe to be in the interest of the company (best defined as the long term interest of the existing shareholders). Unless directors own 100% of the equity, their interest as directors differs from the company's interest.

In some cases a company is taken over for the purpose of liquidating all its assets at a capital profit. This can easily occur if the price of its shares on the market is less than their value on a net assets basis. In the U. K. there was a post-war wave of take-over bids because shareholders did not appreciate the true value of their shares. Directors often worsened the position by distributing unduly low dividends (which reduced the share price and made it easier for take-overs to succeed), and by maintaining the book values of assets at their historic costs (which disguised their true current values from the shareholders). The defences to such a takeover bid would be immediate dividend distributions, bonus issues, full disclosure to shareholders of the true value of their

shares and profit prospects, etc. Of course, if a company cannot make a reasonable profit for its shareholders, and has no prospects of doing so, it ought to be liquidated, so that shareholders can reinvest their capital elsewhere, to the benefit of themselves and the economy as a whole. If the company does not liquidate itself, it lays itself open to take-over and liquidation by other interests, who will of course siphon off some of the proceeds of realisation as capital profits for themselves. This sort of get-rich-quick operation gave take-over bids a bad name in the early days. The remedy lies with the directors, who can promote liquidation themselves so that the shareholders get the benefit.

Evaluation of proposed take-over

A take-over is an investment project and should be evaluated in basically the same way as any other proposed investment.

Different forms of take-over have different tax consequences (which may be all-important), different costs, stamp duties etc. so it is first necessary to evaluate the different methods and decide which is preferred. Then, the price to be paid for the shares acquired, plus interest on capital, should be less than the expected increment in profits, plus proceeds of sale of any surplus assets.

Example

A Ltd. is considering acquiring B Ltd. and has the following information about B Ltd.

Bala	ance Sheet 31st I	December, 1970	
	Rs.		Rs.
Ordinary shares			
100,000 of Rs. 5/-	500,000	Fixed assets	900,000
Reserves	500,000	Current assets	600,000
8% Debentures	300,000		
Current liabilities	200,000		
	1,500,000		1,500,000

B Ltd. has made a steady profit (net of debenture interest) of Rs. 150,000 a year for the last few years. Its shares are quoted at Rs. 12/-. The directors of A Ltd. believe that B Ltd. could make a profit of Rs. 200,000 a year by various economies of operation, and that their own profit could be increased by Rs. 30,000 a year. B Ltd. could also use some of A Ltd.'s surplus manufacturing capacity and sell its own plant for an estimated Rs. 100,000. A Ltd. has a 10% cost of capital. Ignoring tax, personnel, and other considerations, what price should it offer for shares in B Ltd.?

Increment in profit = 200,000 +	+	30,000 =	230,000/year		
Present value of this to A Ltd. =	= 2	230,000		=	2,300,000
		0.10			
Add: proceeds of sale of surplus a	as	sets	tit at senite		100,000
Value of B Ltd. to A Ltd.			THE HOLD		2,400,000
					and the same of th

Therefore, value per share = Rs. 24/-

Thus the maximum that A Ltd. should offer is Rs. 24/-. The minimum is the market price of Rs. 12/- (this may go up if the directors of B Ltd. take action to resist the take-over, or if details of the take-over leak out in advance).

It is possible that B Ltd. could raise their profits to some extent on their own. This determines the real value of shares in B Ltd. to the shareholders, e.g. if they believe that the company could make Rs. 200,000/ year without any merger, and B Ltd. has a cost of capital of, say, $12\frac{1}{2}\%$, they value the equity at $\frac{200,000}{0.125} = 1,600,000$, or Rs. 16 per

share. Therefore, A Ltd. should offer at least Rs. 16 per share to be successful.

Partial and temporary forms of combination

There is an infinite number of ways in which companies may harmonise or combine their interests, which fall short of complete amalgamation. As we have seen, the holding company method is less complete than merger or consolidation, but is usually intended to be permanent, or to lead to complete amalgamation.

All trading contracts freely entered into may be presumed to be mutually beneficial. This extends also to licensing agreements, subcontracting, etc. In effect these are limited and temporary combinations by which the profit on certain business is shared between two or more companies.

Another form of association is the consortium. This is a group of companies which enter into an agreement to provide specified technical, managerial and financial resources to carry out a large project, and to share the profit in a certain way. Usually the project is too large for any single company to handle, e.g. an irrigation/electric power project. The consortium may come to an end on completion of the contract, or be continued for future similar contracts.

Particular functions may be *pooled* on a continuing basis, such as research and development, computer facilities, even sales and distribution, if the respective companies trust the pooled personnel not to favour one company at the expense of the other.

It may be advantageous, for instance, not to take over a supplier company, but to provide it with quality control engineers, research and development finance, etc. (as is done by Marks and Spencer Ltd. and Ford Motor Co. Ltd. in the U. K.)

Other forms of combination are mainly concerned with limiting competition. Companies may agree on the prices at which they will sell their products (a ring), or the quantity which they will sell (sales quota agreements) so as to keep up prices. In Germany, the cartel was a device by which all firms in an industry agreed to sell only to

a central agency, which resold to the public at a fixed price. Most of these arrangements have been held to be in restraint of trade and against the public interest.

More general policy harmonisation and prevention of competition arises out of *interlocking directorates* (some of the directors of one company sit also on the board of the other(s)), and *cross-holdings* of shares (A Ltd. holds less than 50% of the equity in B Ltd. and B Ltd. holds less than 50% in A Ltd.)

5.14 RECONSTRUCTIONS AND REORGANISATIONS

The terms reconstruction and capital reorganisation both mean a major change in the capital structure of a company. A reconstruction also implies the liquidation of the old company and its reconstitution as a new company. A reorganisation may be a major change involving shareholder meetings, but it does not include any legal reconstruction of the company.

The terms reconstruction and reorganisation are applied to different kinds of restructuring:

(i) Writing off loss of capital

Where a business has suffered revenue or capital losses, which appear as debit balances in its Balance Sheet, it may wish to write them off, and write down capital correspondingly, so that it can resume dividend payments out of current profits. (In the Ammonia Soda case, it was ruled that a company may pay dividends out of current profits without first making good the losses of previous years, but this is unsatisfactory, and if there are preference shares, their dividend may leave nothing for the ordinary shares). This is called a "reduction of capital scheme" and requires a special resolution and confirmation of the court, per section 56 of the Companies Ordinance. If the scheme is fair and agreed by all parties there is no difficulty in getting the approval of the court. It is often associated with raising fresh capital, especially working capital.

Such a reorganisation is worthwhile only if future profits, realistically estimated, represent a reasonable return on capital at current market values. (In a reorganisation or reconstruction, assets are always revalued). If this is not so, the company should go into liquidation and return the remaining capital to the shareholders for more profitable re-investment. It may be necessary to put in a fresh management.

The total loss to be written off includes the following:

- (i) any debit balance on profit and loss account
- (ii) any capital losses including any loss on revaluation of the assets, net of any capital profits or reserves
- (iii) any fictitious assets such as discount on issue of debentures, preliminary expenses etc.

- (iv) goodwill (if losses have been made there is probably no goodwill), and patents and trademarks (the latter may be written down to their saleable value if any)
- and (v) any arrears of cumulative preference dividend.

This total loss must be borne by shareholders and/or creditors, by debiting capital or creditors' accounts, and crediting the profit and loss and asset accounts mentioned above.

The first principle is that equity should bear the whole of the loss, since this would be the position if the firm wound up: ordinary shareholders would get only the residue after all prior claims had been met in full. However, if there are preference shareholders, they may be persuaded to accept some of the loss in return for a resumption of preference dividends. If they refuse, future profits go entirely against past losses, i.e. the ordinary shareholders get all the benefit until the losses are fully made up. Alternatively, any loss accepted by the preference shareholders (e.g. arrears of dividend foregone) may be compensated for by offering a higher rate of dividend or by issuing them ordinary shares.

If the loss is more than the issued ordinary share capital, the balance must be met by the preference shareholders (if any), then by unsecured debenture holders and other creditors. Secured debenture-holders and creditors will not, of course, accept any of the loss since they can do better by realising their security.

When the loss exceeds the ordinary share capital the latter is not written off altogether but "kept alive" by writing the nominal value of shares down to a very small amount. It should be clearly understood that the nominal value of their shares makes no difference to the equity shareholders. Whether they are one cent shares or ten rupee shares they will get the same residue of profits available for dividend each year, and the same residue of assets on a winding up. However, they would not agree to any scheme in which they were entirely written out of any future participation in profits or surplus on liquidation.

An alternative procedure is reconstruction. Section 225 of the Companies Ordinance provides that a company can wind up by special resolution. No application to the court is necessary. The liquidator is authorised to sell the undertaking to a new company. Dissenting shareholders must be bought out. This procedure has much the same effect as an internal reorganisation, but provides a more complete break and re-start. The new company can be constituted with a new Memorandum and Articles suited to its future operations.

(ii) Writing up capital profits

Capital profits may be realised, i.e. on sale of fixed assets at above their original cost, and credited to capital reserve. If the profit is required to finance asset replacements it should not be distributed as dividend, but retained as part of the permanent capital. To give proper recognition to this, a capitalisation issue may be made (provided the Articles allow)

(see section 5.5 on bonus issues). If the profit is *not* required for future capital needs, and provided there is no possibility of capital losses on other assets, it should be distributed to the shareholders, Articles allowing. (Articles can, of course, be altered by special resolution of the shareholders).

An unrealised capital profit arises from a revaluation of fixed assets at a figure above their original cost. The Institute of Chartered Accountants (England and Wales) does not approve of revaluation of fixed assets except under special circumstances such as an amalgamation or new capital issue, since the original cost (on which depreciation charges must be based) may be lost to view. If assets are revalued, all should be revalued bona fide, and any net capital profit should be placed to capital reserve. This capital profit does not arise from any transfer of ownership, and should not be distributed until it is realised.

In the Dimbula Valley case, a bonus issue was declared out of an unrealised capital profit. This was allowed by the court, but is not regarded as good practice (see Jenkins Report on Company Law).

(iii) Repayment of excess assets

A business may have assets in excess of its current or foreseeable needs. It is generally preferable that excess assets are returned to owner-shareholders rather than be kept idle or used unproductively. Excess assets may arise from a liquidation of part of the business, or by permanent contraction of the scale of activity.

If the firm has issued debentures, it can redeem them (even before the due date of redemption). If the debentures are quoted, they can be purchased on the market and cancelled. (The company cannot of course purchase its own *shares* on the market; this is allowed in USA but not Ceylon). Similarly, redeemable preference shares may be redeemed. (This is not a reduction of capital since by law an equivalent amount of retained profits must be put to capital reserve, but it does effectively return surplus assets).

If there is no capital redeemable in the ordinary way, assets may be paid out of reserves or, under certain conditions, from the original (irredeemable) capital.

If the business has reserves (revenue reserves and capital reserves other than capital redemption reserve fund or share premium account), the assets to be returned are deemed to be part of those reserves, so this is not a reduction of capital. A dividend may be paid and designated "capital dividend".

If the assets to be returned exceed the reserves, part of the capital is being repaid. This is a reduction of capital scheme and requires a special resolution of the shareholders and confirmation by the court. Similarly any payment from capital redemption reserve fund or share premium account are legally reductions of capital. If there are preference

shareholders who would be entitled to preferential return of capital in a winding-up, the repayment must be made first to them. Similarly any creditor is entitled to be repaid before the shareholders. If the scheme meets these priorities, and is not unfair as between different classes of shareholder, the court will confirm it.

Dividends and capital dividends are almost always in the form of cash, but other forms are possible, if the Articles allow, such as securities and other divisible assets held by the company.

(iv) Refinance debt or redeemable preference capital

If interest rates fall, and the firm has debentures or preference shares on which interest rates are high it can redeem them out of the proceeds of a new issue at lower rates.

Similarly, the opportunity may be taken to convert short term loans and overdrafts into longer term finance. (This is sometimes called "funding" but this term is also used to describe the setting up of a sinking fund to redeem debt and also as a general term for the acquisition of funds).

(v) Simplification of capital structure

A firm may have several different classes of shareholder, stockholder, debenture-holder, etc. each with different rights as to income, capital repayment, and voting at meetings.

The firm may wish to "tidy up" its capital structure by combining or eliminating classes or by rationalising class rights. These all involve variations of class rights and must be fair as between the respective classes. The scheme must be agreed by the holders of three quarters of the shares in each class affected (or as required by the Articles or terms of issue or Memorandum). If the holders of 15% of the shares in a class object and appeal to the court, the scheme needs the confirmation of the court (section 62, Companies Ordinance).

If the company wishes to cancel any uncalled amount on its issued shares, this again is a reduction of capital, per section 56. Since the creditors could be prejudiced by the reduction of the fund available in a winding-up, they are entitled to prior payment or security.

(vi) Division or consolidation of shares

If the market value of a company's shares is high, it may subdivide each share into a number of shares, to reduce their market value and make them more marketable. This may be done by ordinary resolution of the members, Articles permitting. Conversely, shares of low value may be consolidated.

Fully paid-up shares may be converted into stock; there is no practical difference except that the share numbering can be dropped – this simplifies entering transfers in the register.

(vii) Arrangements or compromises with creditors

If a firm is making good profits (or genuinely expects to make reasonable profits on its capital employed in the future), but is insolvent, and cannot meet its creditors who are unwilling to give longer credit, it may be able to persuade them that they would be better off by accepting part payment in full discharge than by forcing the company into liquidation. This is known as compounding with creditors. All creditors must be brought into such a composition. Under Section 151 of the Companies Ordinance, if three quarters by value of the creditors (or class of members, or other class affected) agree to the arrangement and it is sanctioned by the court, it is binding on all creditors (or members) and the company.

An alternative is for the company to reconstruct, i.e. wind up the old company, and issue creditors and members with shares in a new company formed to continue the business. If creditors are not settled in cash in full, the scheme is still an arrangement or compromise requiring their assent.

If the firm will not be profitable in the future, it should go into liquidation. In a voluntary winding-up, a composition with creditors may be made under section 151 or section 242 (which is similar to the above).

5.15 INSURANCE

A wide variety of business risks can be covered by insurance. Every management accountant should be aware of the importance of adequate insurance cover. It will be recalled that a principal objective of a private enterprise is profit, at low risk. Higher profits can often be obtained at higher risk, so a reduction of this risk by means of insurance is equivalent to an increase in profit.

The principle of insurance is that a large number of firms which all face similar risks, such as the risk of fire, agree to pay a small premium into a common pool. The amount of the premium is fixed in relation to the probability of loss, found by experience, so that in the long run, any firm suffering loss can be indemnified (compensated) from the pool. The pool, of course, is run by an insurance company, and the premium must be large enough to meet also the costs of administration.

This mutual-help device has a number of implications:

- (i) in applying to join the pool, a firm must reveal all factors affecting the risk of loss, even if they are not asked for. An insurance contract may be set aside if information has been withheld since the legal principle of uberrimae fidei (utmost good faith) applies,
- (ii) a risk can only be insured if it is outside the firm's control and would cause it genuine financial loss. This excludes for instance, gambling contracts, in which the participant has no insurable interest,

- (iii) insurance provides only *indemnity* against loss. It is not possible to make a profit, e.g. by insuring property above its true value. (Life assurance is different). If the policy has an "average" clause, it is not possible to make a profit by under insuring a risk, and then claiming indemnity for the full loss. If stock valued at Rs. 10,000 is insured for Rs. 8,000 and suffers Rs. 5,000 damage, the insurance company will pay only Rs. 4,000, as the other fifth is deemed to be self-insured.
- (iv) a risk can only be insured against if the insurance company has enough experience to estimate the *probability* of its occurring, and enough firms to enable the law of large numbers to apply. For instance, it would not be possible to insure against a fall off in sales of a certain product as the probability of this could not be estimated.

From a financial evaluation point of view, insurance consists of a sacrifice of short term profit (the premium) for the sake of reduced risk and greater profit stability. A risk should be insured against whenever its occurrence would cause a significant drop in profits. A small firm should therefore insure as much as it can, even down to typewriters and office equipment, since the loss of even one item is material. A very large firm, on the other hand, can act as its own insurer to some extent, as the occasional loss of a minor asset would not severely impact its profits, and would be less than the total premiums payable.

Insurance is a specialised subject, and getting effective cover without waste or duplication of premiums may need expert advice.

All new insurance business in Ceylon is handled by the Insurance Corporation of Ceylon, (except marine cargo risks which may be insured overseas if preferred, and crop insurance which is run by the Department of Agrarian Services). The Insurance Corporation provides the following kinds of cover:

Type of Insurance

1. Fire

Risks Covered

Loss of building, plant & equipment, stock in trade, etc. from fire or lightning, or water damage from extinguishing the fire. The policy may be taken out for the market value of the depreciated asset or, if preferred, for the cost of replacement by a new asset (see notes 1 & 2 below).

1A. Extension to fire policy

Damage (incl. malicious damage) from riot (2 or more persons) and strikes.

Typical Premium

0.1% - 1.2% of value insured, depending on type of building, etc. and standard of construction, situation and occupation.

1B. Further extension

Malicious damage from 1 person riot and strikes.

1C. Other extensions to fire policy

Damage from explosion (note 3), flood etc.

2. Consequential loss (Loss of Profits) (given only if property is insured against fire)

Trading loss arising from reduced turnover and increased costs of working following a fire (see note 4 below) and trading loss arising from any extensions to fire policy i.e. from riot and strikes but not loss from cessation of work.

0.04% – 1% of expected revenue over indemnity period (from fire to recovery to normal), depending on fire tariff and indemnity period.

3. Personal Accident

Accidental disablement or death of partners, managers, employees, etc. (lump sum or weekly allowance). (note 5)

Rs. 4-6 per year per Rs. 1000/-.

3A. Hospital expenses

Hospital bills arising from personal accident or illness.

 $1\frac{1}{2} - 2\%$ per year of amount insured.

3B. Illness

4. Burglary and House-breaking

Loss of property, and damage arising from forcible entry of premises with the intention of committing burglary. (note 6). $\frac{1}{4}\%$ – 1.35% of sum insured, depending on type of risk.

5. Cash or goods in transit

Loss of goods in transit or cash in transit (e.g. collection of pay from bank).

0/05-1/50 per Rs. 1000 carried over whole year, depending on degree of hazard.

6. Personal Baggage

Loss of personal baggage in transit. ½% of value insured.

7. Workmen's Compensation (Employer's Liability).

Claims arising out of accidents to employees in the course of their employment and certain specified occupational diseases (lump sum or fortnightly allowance) (note 7).

 $\frac{1}{8}\% - 7\%$ of annual wages depending on risk to grade of employee.

8. Public Liability

Claims by third parties arising out of negligence of the firm or its employees, e.g. food poisoning claims by customers of a food processing firm, accident claims by visitors to the firm's premises, claims by members of the public on accidents caused by the firm's drivers, etc.

Based on number of visitors, type of trade, number of floors, number of employees, nature of work, turnover, etc. e.g. Rs. 2/50 per Rs. 1000 of turnover.

9. Fidelity guarantee

Loss of assets by theft or embezzlement, by cashier, salesman, storekeeper, book-keeper, etc.

 $\frac{1}{2}\% - 1\%$ of loss cover required depending on degree of risk (higher for cashiers, lower for store-keepers, lower again for book-keepers).

10. Bankers Indemnity (Banks only) Loss due to paying out on forged cheque.

11. Marine

All risks of loss or damage to goods imported or exported, from warehouse to warehouse. 0.2% - 20% or more of value of goods depending on the commodity, shipper, method of packing, buyer and risk of pilferage.

11A. Inland freight

All risks of loss or damage to goods transported within Ceylon (note 8)

ditto

12. Motor

Loss or damage by accident, fire, burglary, housebreaking, theft or malicious damage. Legal liability to third parties for damage to property or personal injury (note 9)

Depends on horse power of vehicle and value insured.

Other types of insurance

Credit insurance (insurance against non-payment of debts owing, for either home sales or export sales) is not available in Ceylon at the time of writing.

Crop insurance indemnifies the farmer for a specified number of bushels or tons per acre at a specified price. Premiums depend on crop, area and cover required. The Department of Agrarian Services runs a crop insurance scheme under which the farmer may be indemnified up to half the value of his crop. Premiums are subsidised by the State.

Pluvius insurance (insurance against rain spoiling an important event) is rarely given, and the premium is high.

- Note (1) Buildings plant and equipment may cost far more to replace than their "market values", so a "reinstatement" policy should be preferred.
 - (2) Stock should be covered against fire and burglary. If stock is frequently moved between buildings, a "floating" policy is preferable to separate coverage for each building.
 - When stock fluctuates seasonally, a policy can be arranged by which the premium is adjusted on monthly declarations of value.
 - (3) Explosion of boilers is sometimes on a separate policy. Avoid duplication.
 - (4) Consequential loss covers loss by interruption of the business from a risk already insured. It does not cover loss of profit from trade fluctuations, competition, Government actions, etc. as some people think. These latter risks remain noninsurable. Consequential loss insurance is basically an addition to ordinary fire insurance and a loss of profits claim will not be entertained unless there is also a material loss claim. However, there are a growing number of extensions that can be included in a loss of profits policy which allow indemnity for losses not arising from material loss, e.g. a factory may insure against losses following breakdown of plant (e.g. refrigeration equipment) or against denial of access for its raw materials, personnel and finished goods due to external floods, landslide, Similarly a hotel may insure against the possibility of an epidemic scaring away clientele. Enquiry should be made of the Insurance Corporation for any special risks for which profits cover is required.

The effect of a fire is to reduce production and sales not only in the period of disorganisation immediately after the fire but continuing until the normal level of sales is fully recovered. This varies from firm to firm; typical periods range from 18 to 42 months. The firm should estimate this "indemnity period" and cover itself fully, remembering that in the event of underinsurance, loss claims are averaged, i.e. reduced by the proportion of the loss not insured.

The mechanics of calculating actual loss are as follows:

(i) the loss of revenue is calculated as the difference between actual revenue in the indemnity period, and the revenue for the corresponding period in the previous year (or years).

This may be adjusted for differences in selling prices. For instance, if a tea factory produces 100,000 lbs. less tea than the previous corresponding period, the loss in revenue would be 100,000 lbs. at the *current* prices.

(ii) the loss of profit is taken as the proportion of the lost revenue that "gross profit" bears to revenue in the last financial year. "Gross profit" here means revenue minus costs that vary more or less proportionately with revenue, such as purchases, duty, freight inwards and outwards, cash discounts received and allowed, bad debts, electric power, consumable supplies, etc. (Note that this differs from the accountants' definition of gross profit, but leads to the actual loss of profit since, though the revenue is lost, the variable costs are saved).

An alternative method of calculation is to take net profit, plus all fixed and semi-fixed costs ("standing charges"). This gives the same "gross profit" figure.

(iii) to the above loss is added any increased costs of working incurred in order to reduce the loss of turnover, such as rent of temporary premises, hire of plant, extra labour and overtime costs, extra costs of obtaining goods from other sources, etc.

As with all indemnity insurance, the indemnity is limited to the actual loss, i.e. the actual loss of profit over the actual period of recovery, as certified by an accountant. If premium has been paid for a higher cover, some rebate may be made within limits. If a policy has been taken out for less than full cover, whether in respect of turnover, standing charges, or indemnity period, then the firm is regarded as being its own insurer for the balance, and the claim is averaged (reduced in proportion).

- (5) Accident policies, also life policies, may be taken out for key personnel, especially if they travel extensively. Vehicle drivers and other groups of employees may be covered under group schemes.
- (6) Burglary cover should not be limited to removeable items, as this type of policy covers also damage by vandals to fixed machinery.
- (7) The Insurance Corporation may also provide an inspection service to ensure that the detailed provisions of factory legislation are being complied with.

Cover includes legal costs in defending claims.

- (8) Commercial vehicle policies do not cover goods carried by the vehicle; separate cover is necessary.
- (9) When a fleet of vehicles is to be insured, a block policy simplifies administration.

COLOMBO BROKERS' ASSOCIATION BY-LAWS

(Revised up to 12th December, 1964)

FOR

OFFICIAL LIST, QUOTATIONS, AND DEALINGS

1. A List of Securities (hereinafter referred to as "the Official List") shall, at such intervals as it may from time to time think fit, be published under the authority of the Committee of the Colombo Brokers' Association (hereinafter referred to as "the Committee"), in which shall be quoted such securities as the Committee shall from time to time decide, but subject always to these by-laws including the schedule hereto comprising the several Parts thereof and the Appendix thereto.

2. (i) Applications for quotation in the Official List must be made, in the time and manner provided in and otherwise in conformity with these by-laws (including the schedule hereto), to the Secretaries of the Association by the company which desires its shares or securities to be quoted, and must be submitted through a member of the Association whose duty it shall be to satisfy themselves that the administrative details of these by-laws and the schedule have been complied with.

(ii) Every such application shall be in the form in, shall comply with the requirements contained in, and shall be accompanied by the documents particulars whereof are detailed in, the schedule hereto and must be in respect of all securities of the class or category to which the application relates.

(iii) The Secretaries will circulate every such application amongst the members of the Share Sub-Committee of the Association and, if approved by them or subject to such amendment thereof as may be recommended by that Sub-Committee, the application shall then be considered by the Committee.

(iv) No application will be considered—

- (a) in respect of any company of which the issued capital is less than Rs. 100,000, and
- (b) unless a percentage (considered by the Share Sub-Committee to be reasonable) of the issued capital of the company is available or to be made available to the public.

Prior to the application being submitted, enquiry may be made through the Secretaries concerning the percentage which is likely to be considered reasonable.

(v) Each application will be considered on its individual merits. Its acceptance or rejection or deferment will be in the discretion of the Committee (who may require that the application or any of the documents accompanying it shall be amended) and, if accepted, quotation will be granted with effect from such date as the Committee shall determine.

- 3. The Official List shall, unless the Committee otherwise orders, contain a record of quoted securities with such particulars and in such form as the Committee shall determine, including bargains marked by members of the Association.
- 4. The Committee may make such provisions and give such directions as it thinks fit for the recording of bargains in inactive quoted securities, without prejudice however to the validity of the quotation granted to such security.
- 5. No list or record of dealings shall be issued or sold by a member of the Association without the sanction of the Committee.
- 6. The grant of a quotation may be suspended or cancelled, and the security may be withdrawn from the Official List, and the recording of bargains may be suspended, on the authority of the Committee.
- 7. The decisions of the Committee regarding (a) the acceptance or rejection or deferment of an application for quotation, or (b) the suspension or cancellation of a quotation, or (c) the suspension of a record, shall be notified to all members of the Association and to the company whose securities are affected thereby.
 - 8. (i) Dealings are permitted in the following securities—
 - (a) securities which are quoted in the Official List or which, having been granted a quotation, have been withdrawn therefrom on account of lack of dealings;
 - (b) Treasury Bills, Loans, Stock, Bills, Mortgages, and short-term securities of the Government of Ceylon or of any Local Government authority in Ceylon, or other securities issued or guaranteed by or on behalf of the Government of Ceylon or Government sponsored corporations, State Industrial Corporations, or corporations established by or under any statute;
 - (c) securities which have been granted a quotation on a Stock Exchange or a Stock Brokers' Association outside Ceylon.
- (ii) Subject as above provided, dealings are not permitted in any securities until the date as from which quotation has been granted, unless the sanction of the Committee shall have been obtained for any specific transaction.
- 9. The Committee may from any cause prohibit dealings in any securities and every such decision shall be notified to members of the Association.
- 10. (i) There shall be payable to the Association a fee of Rs. 250/or one-tenth per cent of the nominal value of the security for which a quotation is granted, whichever is more (but with a maximum of Rs. 10,000/-); but, where the quotation is in respect of Rights, Bonuses,

Capitalisations, Open Offers, Reconstruction and further issue of securities identical to those for which a quotation has previously been granted, one half only of the foregoing fee shall be payable.

- (ii) No fee is payable for stock unit applications, unnumbering of shares, or applications arising out of change of name, denomination, dividend rights, or exercise of conversion or option rights.
- (iii) Fees are payable with the application and are non-refundable whether or not a quotation is granted.

SCHEDULE

PART I

REQUIREMENTS FOR QUOTATION—COMPANIES

- (1) Every application for quotation must be in the form set out in Part II of this Schedule and be accompanied by the following documents:—
 - (a) a statement in the form set out in Part III of this Schedule which shall contain an undertaking as soon as possible after the grant of a quotation to lodge with the Secretaries an affidavit of compliance in one of the forms set out in Part IV of this Schedule (as appropriate and adapted to meet the facts and circumstances of the case);
 - *(b) certificate of incorporation or a certified copy thereof;
 - *(c) certificate, if any, entitling the company to commence business or a certified copy thereof;
 - *(d) two copies of the Memorandum and Articles of Association, or other corresponding documents. These must comply with Part V of this Schedule;
 - (e) where the application relates to debentures, debenture stock or notes, two copies of the mortgage securing the same and relative trust deed or (where the same are not secured) two copies of the debenture, debenture stock certificate, or note, and of any deed relating to the same. These must comply with Part VI of this Schedule;
 - (NOTE:— In the event of the documents specified in (d) and (e) above not complying with the requirements of the Committee and if the Committee is satisfied that it is impracticable for the company to alter them before quotation is granted, the Committee may accept an undertaking to amend these documents at the earliest opportunity).
 - (f) where the application relates—
 - (i) to an offer to the public by Prospectus or Offer for Sale of a security which is new to the Official List and will not be identical with any security for which a quotation has

- already been granted:— by the Prospectus or Offer for Sale which must comply with the requirements of Part XII, whether or not required by law;
- (ii) to a security to be Placed or Introduced and which is new to the Official List and will not be identical with any security for which a quotation has already been granted:— by a Prospectus, Offer for Sale, or Statement (which shall be filed with the Registrar of Companies) which shall conform to Part XII and shall be signed by every person named therein as a Director or proposed Director or his authorised agent. If the security is of a company for part of the capital of which a quotation has already been granted, see note 4 to Part XII on page 20;
- (iii) to a security which has been or will be offered in terms of a Circular by way of Rights, Bonus, or Capitalisation, or as an Open or Conversion Offer to shareholders and for some part of the capital of the company a quotation has already been granted:— by the Circular stating the terms of the issue and containing full details of any underwriting arrangements and an estimate of the net proceeds of the issue and how such proceeds are to be applied;
- (iv) to a security which has not been issued to the public or offered in terms of a circular to shareholders of a company and the security is or will become identical with a security for which a quotation has been granted:— by a copy of any resolution, circular, order of Court, agreement, allotment letter, definitive certificate and any other document or information relevant to the issue;
- NOTES:-(1) Where the security to which the application relates is or has been an issue in satisfaction (whether in whole or in part) of the purchase price of an asset or the whole or any part of the proceeds of the issue has been or is to be applied directly or indirectly in the purchase of a business, property or shares of a company which is or will become, by reason of such purchase, a subsidiary of the company, the application must be accompanied by (i) a certified copy of the agreement covering the purchase and sale of the asset business property or shares (ii) a report made by qualified accountants with respect to matters required by paragraph 21 of Part XII and (iii) draft of the circular to shareholders setting out such report and notifying the issue and terms thereof.
 - (2) The requirements stated above relate generally to information which has to be made available upon an application for a quotation and the

Committee may require additional or alternative information as may in relation to any application appear necessary.

- (g) specimen of any allotment letter, provisional allotment letter, acceptance letter or letter of rights (which shall conform to the requirements set out in Part VII of this Schedule) issued or to be issued in respect of the securities to be quoted;
- (h) a specimen of the definitive certificate, which shall comply with the provisions of Part VIII of this Schedule;
- *(i) a statement giving the following particulars of every Director—
 - (1) any present and former Christian names and surnames,
 - (2) his nationality,
 - (3) his nationality of origin, if his present nationality is not the nationality of origin;
 - (j) a certified copy of the Board Resolution authorising the Prospectus, Offer for Sale, Statement, Circular or Issue;
 - (k) a certified copy of every letter, Report, Balance Sheet, Valuation, Contract or other document any part of which is extracted or referred to in the Prospectus, Offer for Sale, Statement or Circular required to accompany the application;
 - (1) a certified copy of the written consent of any expert to the inclusion in the Prospectus, Offer for Sale, Statement or Circular (required to accompany the application) of a statement purporting to be a copy of or an extract from or a summary of the report or valuation or other statement of such expert;
- (m) a marketing statement in the form set out in Part IX to this Schedule or as near thereto as circumstances admit;
- *(n) three copies of the company's last audited accounts submitted to its members at an Annual General Meeting together with particulars of any variation since the date of such accounts in the amount of the authorised or issued capital, debentures or loans shown in such accounts;
 - (o) a draft of the advertisement proposed to be published relating to the Prospectus or Offer for Sale, or Statement;
 - NOTE:- (i) the contents and form of the advertisement shall be subject to approval by the Committee;
 - (ii) every advertisement shall be published not less than once in at least one leading Colombo daily newspaper and may only be published after the application for quotation has been accepted and the documents accompanying it and the contents and form of the advertisement have all been approved by the Committee;

- (iii) subject to the proviso in this note, the advertisement may be in full or, at the option of the Company concerned, may take an abbreviated form: Provided that, where a Statement is to be advertised or if the securities for which a quotation is applied have been or are to be underwritten, the advertisement shall be in full;
- (iv) if the advertisements is to take an abbreviated form, it shall at least provide particulars of—

the name of the Company,

the names and addresses of its Directors,

the name of its bankers.

the name of its proctors,

the name of its auditors.

the name of the brokers to the issue.

the amount of the issued capital and particulars of the securities which are the subject of the Prospectus or Offer for Sale,

a brief general description of the Company's initial business,

AND

a statement (a) that the advertisement is in an abbreviated form, intended only to acquaint the public with the matters therein appearing, (b) that (as may be the case) application for quotation on the Official List has been made or accepted (c) that full particulars of the Company's objects and business appear in the Prospectus or Offer for Sale, and (d) giving clear and distinct particulars of the names and addresses of persons to whom application may be made for copies of the full and entire Prospectus or Offer for Sale accompanied by forms of application for the securities.

- (2) Applications required to be accompanied by—
 - (a) the documents mentioned in paragraph (f) (iii) and which relate to a security which will be or become identical with securities for which a quotation has already been granted, or
 - (b) the documents mentioned in paragraphs (f) (i) and (ii) shall (accompanied by the requisite documents or drafts thereof for initial approval) be made at least twenty-one days before the intended date of issue of the relevant Prospectus, Offer for Sale or Statement or fourteen days before the intended date of issue of the relevant Circular;

- (3) Applications required to be accompanied by the documents mentioned in paragraph (f) (iv) shall (accompanied by the requisite documents or drafts thereof for initial approval) be made at least fourteen days before the proposed date of the issue of any Circular intended to be issued in respect of the Offer of the securities mentioned in the application or, if there be no Circular, before the intended date of allotment thereof: Provided however that if in consequence of any Order of Court the time limit specified above cannot be complied with the application shall be made as soon as practicable and where possible before the issue of any Circular relating to or the allotment of any securities comprised in the application;
- (4) In all other cases the application shall be made within such time prior to the date upon which the quotation applied for is to be effective as the Committee on enquiry through the Secretaries shall determine.

GENERAL NOTES:-

- 1. The documents marked* need not be furnished if securities of the Company are already quoted.
- 2. The marketing statement referred to in (m) is not required where the application relates to an offer to the public by Prospectus or Offer for Sale (f) (i) above), or to an offer in terms of a Circular by way of Rights, etc. (f) (iii) above).
- 3. If required by the Committee provision must be made for any documents referred to in the Circular to be open for inspection for a reasonable time (not being less than fourteen days) at a place in Colombo.

PARTS II - XI are not reproduced here.

PART XII

The following information and requirements must be given or dealt with in any Prospectus or Offer for Sale or Statement required under clause (f) of Part I:—

- 1. The full name of the Company.
- 2. (a) In the case of a Prospectus or Offer for Sale, the time of the opening of the Lists.
 - (b) In the case of a Statement, a Note as follows:—
 - "This Statement is issued in compliance with the By-Laws of the Colombo Brokers' Association for the purpose of giving information to the public with regard to the Company. The Directors collectively and individually accept full responsibility for the accuracy of the information given and confirm having made all reasonable inquiries that to the best of their knowledge and belief there are no other facts the omission of which would make any statement herein misleading."

- 3. A statement that an application for permission to deal and for quotation has been made to or, as the case may be, has been accepted by the Colombo Brokers' Association.
- 4. The authorised share capital, the amount issued or agreed to be issued, the amount paid up and the description and nominal value of the shares.
- 5. (i) The authorised loan capital of the Company and any of its subsidiaries, the amount issued and outstanding or agreed to be issued, or, if no loan capital is outstanding, a statement to that effect.
- (ii) Particulars of any bank overdrafts of the Company and any of its subsidiaries, as at the latest convenient date or, if there are no bank overdrafts, a statement to that effect.
 - 6. The full names, address, and description of every director.
- 7. The full names and professional qualification (if any) of the Secretary, and the situation or postal address of the registered office of the Company.
- 8. The names and addresses of the Bankers, Brokers, Proctors, Registrars and Trustees (if any).
 - 9. The name, address, and professional qualification of the Auditors.
 - 10. If the application is in respect of shares:-
 - (i) the voting rights of shareholders;
 - (ii) if there is more than one class of shares, the rights of each class of share as regards dividend, capital, redemption, and the creation or issue of further shares ranking in priority to or pari passu with each class other than ordinary shares; and
 - (iii) a statement as to the consents necessary for the variation of such rights.
- 11. The provisions or a sufficient summary of the provisions of the Articles of Association, contract or other corresponding document with regard to:—
 - (a) qualification of directors,
 - (b) remuneration of directors or other similar body,
 - (c) any power enabling the directors to vote remuneration to themselves or any members of their body,
 - (d) the borrowing powers exercisable by the directors and how such borrowing powers can be varied.
- 12. The date of the Board resolution creating any loan capital, the rights conferred upon the holders thereof, the obligations undertaken by the Company in respect thereof and short particulars of any mortgages and charges subsisting on any part of the Company's assets.

Any statement relating to Debentures or Debenture Stock issued by way of conversion or replacement of Debentures or Debenture Stock previously issued shall state all material differences between the security for the old Stock and the security for the new Stock or (if such be the case) shall state that the security for the new Stock is identical with the security for the old Stock.

13. Particulars of any provisions (other than any invalidated by law) of the Articles of Association and/or Trust Deed for the indemnification

of directors and/or trustees and/or their relief from responsibility.

14. The date and country of incorporation. The authority under which the Company was incorporated and the date (if any) of conversion into a public company.

15. Particulars of—

- (i) *any alterations in the share capital within the two years preceding the publication of the Prospectus, Offer for Sale or Statement and
- (ii) the names of the holders of any substantial or controlling beneficial interest in the capital of the Company and the percentage amount of their holdings. A holding of or in excess of 25% of the issued capital of the Company is to be regarded as substantial,
- The principal objects of the Company. The situation, area and tenure of its properties (if any) and, in the case of leasehold property, the rent of such lease and the unexpired period thereof.
- The name, date, country of incorporation, and capital of any company which is or is about to become a subsidiary, together with details of capital held by the parent Company. The principal objects and the situation, area and tenure of the property (if any) of any such subsidiary including (in the case of leasehold property) the rent of such lease and the unexpired period thereof.
- 18. A statement as to the financial and trading prospects of the Company together with any material information which may be relevant thereto.
- 19. A statement by the Directors that in their opinion, the working capital is sufficient or, if not, how it is proposed to provide the additional working capital thought by the Directors to be necessary.
 - A report by the auditors of the Company:-20.
 - (i) with respect to the profits or losses of the Company in respect of each of the five completed financial years immediately preceding the publication of the Prospectus, Offer for Sale or Statement, or in respect of each of the years since the incorporation of the Company if this occurred less than five years prior to such publication; and, if in respect of a period ending on a date earlier than three months before such publication no accounts have been made up, a statement of that fact. In

- making such report the auditors shall make such adjustments (if any) as are in their opinion necessary for the purposes of the Prospectus, Offer for Sale or Statement;
- (ii) in the case of an issue by a holding company, in lieu of the report in (i), a like report with respect to the profits or losses of the Company and of its subsidiary companies, so far as such profits or losses can properly be regarded as attributable to the interests of the holding company;
- (iii) with respect to the rates of the dividends, if any, paid by the Company and by its subsidiary companies (if any) in respect of each class of shares in respect of each of the years referred to in (i) above, giving particulars of each such class of shares on which such dividends have been paid and particulars of the cases in which no dividends have been paid in respect of any class of shares in respect of any of those years;
- (iv) with respect to the assets and liabilities of the Company and, in the case of an issue by a holding company, a like report with respect to the assets and liabilities of the Company and of its subsidiary companies so far as attributable to the interests of the Company. In making such report the auditors shall make such adjustments as are in their opinion necessary for the purposes of the Prospectus, Offer for Sale or Statement;
- (v) with respect to the aggregate emoluments paid to the Directors by the Company during the last period for which the accounts have been made up and the amount (if any) by which such emoluments would differ from the amounts payable under the arrangements in force at the date of the Prospectus, Offer for Sale or Statement;
- (vi) with respect to any other matters which appear to the auditors to be relevant having regard to the purpose of the report.
- 21. If the proceeds, or any part of the proceeds, of the issue of the shares or debentures are or is to be applied directly or indirectly in the purchase of a business or of shares in a company which is, or will by reason of such purchase become, a subsidiary company of the Company, a report made by qualified accountants who shall be named in the Prospectus, Offer for Sale or Statement;
 - (i) with respect to the profits or losses of the business or to the profits or losses attributable to the interests acquired or being acquired by the Company in the subsidiary in respect of each of the five completed financial years preceding the publication of the Prospectus, Offer for Sale or Statement or in respect of each of the years since the commencement of the business or the incorporation of such subsidiary if this occurred less than five years prior to such publication; and, if in respect of a period ending on a date earlier than three months before such publication no accounts have been made up, a statement of that fact.

Provided that where any such subsidiary is itself a holding company the report shall be extended to the profits or losses of that company and its subsidiary companies which shall be ascertained in the manner laid down in sub-paragraph (ii) of paragraph 20;

- (ii) with respect to the assets and liabilities of the business or of the subsidiary and where such subsidiary is itself a holding company the report shall be extended to the assets and liabilities of that company and of its subsidiary companies in the manner laid down in sub-paragraph (iv) of paragraph 20;
- (iii) with respect to any other matters which appear to the accountants to be relevant having regard to the purpose of the report.

In making such report the accountants shall make such adjustments (if any) as are in their opinion necessary for the purposes of the Prospectus, Offer for Sale or Statement.

- 22. Particulars of any capital of the Company or of any of its subsidiaries which has within the two years immediately preceding the publication of the Prospectus, Offer for Sale or Statement issued or is proposed to be issued fully or partly paid up otherwise than in cash and the consideration for which the same has been or is to be issued.
- 23. Particulars of any capital of the Company or of any of its subsidiaries which has within the two years immediately preceding the publication of the Prospectus, Offer for Sale or Statement been issued or is proposed to be issued for cash, the price and terms upon which the same has been or is to be issued and (if not already fully paid) the dates when any instalments are payable with the amount of all calls or instalments in arrear.
- 24. Particulars of any capital of the Company or of any of its subsidiaries which is under option, or agreed conditionally or unconditionally to be put under option, with the price and duration of the option and the consideration for which the option was granted, and the name and address of the grantee: Provided that where an option has been granted or agreed to be granted to all the members or debenture holders or to any class thereof, it shall be sufficient, so far as the names are concerned, to record that fact without giving the names and addresses of the grantees.
- 25. (i) Particulars of any preliminary expenses incurred or proposed to be incurred, and by whom the same are payable, except in the case of a company whose accounts for at least two years have been made up and audited.
- (ii) The amount or estimated amount of the expenses of the issue and of the application for quotation so far as the same are not included in the particulars of preliminary expenses under the preceding subparagraph, and by whom the same are payable.

- 26. Particulars of any commissions, discounts, brokerage, or other special terms granted within the two years immediately preceding the publication of the Prospectus, Offer for Sale or Statement, in connection with the issue or sale of any capital of the Company or of any of its subsidiaries.
- 27. (i) The names and addresses of the vendors of any property purchased or acquired by the Company or any of its subsidiaries within the two years immediately preceding the publication of the Prospectus, Offer for Sale or Statement, or proposed to be purchased or acquired on capital account and the amount paid or payable in cash, shares or securities to the vendors and, where there is more than one separate vendor or the Company or subsidiary is a sub-purchaser, the amount so paid or payable to each vendor and the amount (if any) paid or payable for goodwill.
- (ii) Short particulars of all transactions relating to any property falling within the immediately preceding sub-paragraph which have taken place within the two years immediately preceding the publication of the Prospectus, Offer for Sale or Statement and in which any vendor or director or proposed director or promoter was or is directly or indirectly interested.
- (iii) The amount of any cash or securities paid or benefit given within the two years immediately preceding the publication or proposed to be paid or given to any promoter and the consideration for such payment or benefit.
- 28. (i) The name of every promoter; and (if the promoter be a company) a statement of its issued share capital, the amount paid up thereon, the date of its incorporation, the names of its Directors, Bankers, and Auditors, and such other particulars as the Committee think necessary in connection therewith.
- (ii) The amount of any cash or securities paid or benefit given within the two years immediately preceding the publication of the Prospectus, Offer for Sale or Statement, or proposed to be paid or given, to any promoter and the consideration for such payment or benefit.
- 29. Full particulars of the nature and extent of the interest direct or indirect, if any, of every Director in the promotion of or in any property purchased or acquired by the Company or any of its subsidiaries within the two years immediately preceding the publication of the Prospectus, Offer for Sale or Statement, or proposed to be purchased or acquired by the Company or any of its subsidiaries.
- 30. A statement of all sums paid or agreed to be paid to any Director or to any firm or company of which he is a member, in cash or shares or otherwise, by the Company or by any person either to induce him to become or to qualify him as Director or otherwise for service rendered by him or by the firm or company in connection with the promotion or formation of the Company.

- 31. Where the Prospectus, Offer for Sale or Statement includes a statement purporting to be made by an expert, a statement that the expert has given and has not withdrawn his written consent to the issue of the Prospectus, Offer for Sale or Statement, with his statement included in the form and context in which it is included.
- 32. The dates of and parties to all material contracts entered into within two years preceding the publication of the Prospectus, Offer for Sale or Statement, with a description of the general nature of the contracts, not being contracts entered into in the ordinary course of the business carried on or intended to be carried on by the Company.
- 33. A reasonable time (being not less than fourteen days) during which and a place in Colombo at which the following documents (or copies thereof) where applicable may be inspected: the memorandum and articles of association, mortgage, trust deed, deed poll, all material contracts or in the case of a contract not reduced into writing a memorandum giving full particulars thereof, all reports, letters, balance sheets, valuations and statements by any expert any part of which is extracted or referred to in the Prospectus, Offer for Sale or Statement, a written statement signed by the auditors or accountants setting out the adjustments made in the report on the profits and giving the reasons therefor, and the audited account of the Company for each of the two financial years immediately preceding the publication of the Prospectus, Offer for Sale or Statement, together with all notes, certificates and information required by the Companies Ordinance.

NOTES:-

- 1. In cases where it is contended that contracts cannot be offered for inspection without disclosing to trade competitors important information the disclosure of which might be detrimental to the Company's interests, application may be made to the Committee to dispense with the offering of such documents for inspection.
- 2. In any case where information is not given under any of the above paragraph Nos. 22, 23, 24, 26, 27, 28, 29, and 30, the Prospectus etc. must state that no such payments etc. have been made or explain why the information is not given.
- 3. Under paragraph Nos. 22, 23, 24, 26, 27, and 29, reference to subsidiaries is to be construed as including any company which will become a subsidiary by reason of an acquisition falling within paragraph No. 21.
- 4. In the case of a Company for part of whose capital a quotation has already been granted, the Prospectus etc. shall conform to all the above paragraphs, except that Nos. 11 (a), 14, 15, 16, and 17 shall not apply.
- 5. The requirements stated above are in general applicable to general trading and estate-owning companies. The Committee may require additional or alternative information for companies engaged in other enterprises.

TYPICAL EXAMINATION QUESTIONS

- 1. Explain the following terms with simple numerical examples:
 - (i) high gearing
 - (ii) debt/equity ratio
 - (iii) hidden gearing (or off-the-Balance Sheet finance).
- 2. A public company is proposing to replace existing temporary bank finance with more permanent funds to be raised on the capital market. To what matters will it be necessary to give attention when deciding upon (a) the most suitable time to come to the market and (b) the form of the offer, i.e. fixed interest or equity, in such a funding operation?

 ACCA IV 6/67
- 3. The latest audited Balance Sheet of Pekoe Tea Co. Ltd. as on 31st December 1966, is summarised as follows:-

	Rs.	Rs.	Lead in clima Line	Rs.	Rs.
Share Capital			Fixed Assets		
Authorised			Land and cost of		
140,000 Ordinary	y		Development		650,000
Rs. 10 each		1,400,000	Buildings Plant and Machiner	37	550,000 275,000
			Motor Vehicles	y	25,000
Issued					1,500,000
100,000 Ordinary					1,500,000
Shares of Rs. 10		4 000 000			
each fully paid Capital Reserve		1,000,000	C		
Property Develo	n-		Current Assets Cost of tea		
ment Account	P	500,000		,000	
Revenue Reserves		,	Debtors includ-	,000	
General Reserve	620,000		ing prepayments 90	,000	
Profit and Loss Account	10,000	630,000	Investments at		
Loss recount		030,000	cost (Market value		
				,000	
			Fixed Deposit 300	,000	
T T 1000		2,130,000	Balance at Bank 754	,667	1,896,667
Income Tax 1967/6 Current Liabilities	58	270,000			
& Provisions					
Creditors &					
Accrued Charges	280,000				
Taxation	550.000				
provision Proposed Final	550,000				
Dividend (net)	166,667	996,667			
(1100)	-	3,396,667			2.206.667
		3,370,007		-	3,396,667

The Pekoe Tea Co. Ltd. owns an estate of 1,000 acres which is fully cultivated, and the directors have now decided to acquire another high-grown tea estate situated in the Dimbula district with a cultivated acreage of 910 acres at a cost of Rs. 1,800,000 which includes legal and other expenses. They wish to finance the purchase of this estate out of the available surplus cash and from an issue of loan and share capital.

You are given the following additional information:-

- (1) The balance in the property development account represents accumulated profits which have been expended on the development of the present estate owned by the company and the directors are of the view that the shareholders should receive the benefits from such expended profits.
- (2) The company has paid an average dividend of 24 per cent for the past 3 years.
- (3) The directors wish the rate of dividend that would be applicable immediately after whatever capital adjustment that may be deemed necessary prior to the acquisition, to be maintained at the same level even after acquisition.
- (4) The present market value of the shares is Rs. 24. Quoted shares in similar companies are priced to give a yield of 12 per cent.
- (5) The estate to be purchased is expected to make a profit after tax of Rs. 250,000.
- (6) It is estimated that the working capital should cover at least 2 months' estate expenditure which in the case of the present estate amounts to Rs. 400,000 and for the new estate Rs. 300,000.
- (7) The borrowing powers of the company permit the directors to raise monies through the issue of debentures repayable within a period of 10 years for which a redemption reserve has to be created out of profits. The present rate of interest on debentures is 6 per cent.

From the information available, you are required to write a report to the directors suggesting a suitable scheme for raising the finance required to acquire and work the new estate and for adjusting the future capitalisation of the company so that the benefits will accrue to the existing shareholders.

(ICAC Final 12/67)

4. The directors of Modern Confectioners Ltd. have decided to obtain a quotation for the Ordinary shares of the Company from the Colombo Brokers' Association. At the same time they wish to raise additional capital of Rs. 180,000 in order to install new machinery required to meet the increased demand for their products.

The latest summarised balance sheet of the company as on 31st December 1968 is as follows:-

Share Capital	Rs.		Rs.
Authorised 45,000 shares of Rs. 10 each	450,000	Fixed Assets at cost less depreciation Freehold Land and	
	-	Buildings	160,000
		Plant and Machinery Fixtures and Fittings	180,000 20,000
Issued			360,000
30,000 Ordinary shares of Rs. 10 each			
6% Loan (secured on	300,000		
fixed assets)		A. Marian and A. Anamore and	
Revenue Reserves Current Liabilities	40,000	Current Assets Stock	162,000
(including provision for		Debtors	162,000 53,000
the first and final		Balance at Bank	45,000
dividend of 15%)	80,000		
	620,000		620,000
			-

You are given the following additional information:-

- (a) The average profits of Modern Confectioners Ltd. for the past five years after charging all expenses, including depreciation, but before charging loan interest was Rs. 65,000 per annum. It is anticipated that, when the additional machinery is installed, such profits will be increased to Rs. 95,000.
- (b) In the past five years a dividend of 15 per cent has been paid on the Ordinary shares and the directors are confident that this rate of dividend can be maintained in the future.
- (c) The prevailing market conditions are equally favourable for an issue of 7% Unsecured Debenture Stock 1977-79 or 8% Redeemable Preference shares. Ordinary shares of similar companies are quoted in the share market to give a yield of 10 per cent.
- (d) Under the Articles of Association, all new shares issued have to be offered to existing shareholders and the capital of the company can only be increased with the consent of the shareholders in general meeting. In order to obtain a quotation, the directors who at present hold 70 per cent of the ordinary shares have, however, agreed to make available 20 per cent of the total ordinary shares of the company (inclusive of any further issue made up to the time of obtaining a quotation) from their holdings for free dealings in the market.

(e) It is estimated that the cash resources available will be sufficient for the future running of the business.

From the information given above, and subject to any assumptions you consider necessary, you are required to write a report to the directors—

- (i) explaining the financial considerations involved in raising the additional capital by means of the three types of issue mentioned above and setting out your recommendations for raising the additional capital, and
- (ii) outlining briefly the steps to be taken by the company to obtain a quotation for the ordinary shares. (Ignore taxation) (ICAC Final 6/69)
- 5. Describe the sources and types of short and medium finance, other than the conventional bank overdraft, available to a company.

 (ACCA IV 12/67)
- 6. How may a business finance replacement and expansion of its manufacturing capacity without raising outside capital?

What are the advantages and disadvantages of these sources of finance?

- 7. Write short notes on three sources of foreign exchange finance available for private firms in Ceylon.
- 8. The following is a summary of the accounts of a company over a period of 23 years:

	Balance Sheets at year end					
Fixed assets at cost less depreciation	• •	1944 Rs.'000 200 25	1951 Rs.'000 200 132	1958 Rs.'000 317 148	1966 Rs.'000 504 235	1967 Rs.'000 519 243
Trading assets, net Quick resources		175 200 35	68 300 66	169 460 (5)	269 560 3	276 580 1
Equity capital and retained profit		410	434	624	832	857
		Profit	and Loss	Account	s for the	year
Trading profit Depreciation		1944 80 25	1951 120 10	1958 184 24	1966 224 39	1967 232 40
Profit before taxation		55	110	160	185	192

318	Management	Acce	ountancy	in Ceylon		
Taxation Dividend, gross Retained		15 24 16	56 30 24	80 50 30	95 70 20	97 70 25
		55	110	160	185	192
		In	idex Num	bers		
Wholesale prices	, Test. Julia	100	150	230	280	290

A financial commentator suggests that, because of the changing value of money, the company has in effect been paying dividends out of capital.

You are asked to comment on this statement, saying whether:

- (a) you agree with the commentator's calculations and with his interpretation of the facts; and
- (b) in your view the company has fulfilled its obligations to its shareholders. (ICWA V 6/68)
- 9. As a general guide, the Ceylon Association of Manufacturers has recommended that an amount equal to one quarter of the dividends paid should be set aside for improvements and expansion.

 Comment.
- 10. Stretchtwist Ltd. is a public company engaged in the plastics industry and it is proposing to make a bid for the whole of the issued share capital of Pliable Pins Ltd. which is a private company operating in a similar line of business. The ordinary shareholdings in Pliable Pins Ltd. are evenly distributed between twelve members. The preference shares are held by one other person.

In the event of liquidation the preference shareholders are entitled only to a repayment of the nominal value of their shares. There is no right to share in any profits after the 7% has been paid.

The expected market return on similar preference shares is 6% and on ordinary shares 10%.

From the following information draft a concise and informative report to the Preference and Ordinary shareholders of Pliable Pins Ltd. setting out your recommendations as to what you would consider to be a reasonable price for each class of shares.

Balance Sheet

Share Capital:	Rs.	Fixed Assets:	Rs.
7% Preference shares of		Buildings	95,000
Re. 1/	20,000	Plant and Machinery	105,000
Re. 1/– Ordinary shares	200,000		
	220,000		200,000
Revenue Reserve	70,000	Current Assets:	
Future Tax	10,000	Govt. Securities	60,000
		(market value	
Control of the Contro	300,000	Rs. 52,000)	
Trade Creditors	25,000	Stock	20,000
		Debtors	40,000
		Cash	5,000
	325,000		325,000

Profit Record - Years ending 31st December

	Trading Profit	Investment	Directors'
	(before tax)	Income	Remuneration
	Rs.	Rs.	Rs,
1967	 24,000		2,500
1968	 25,000	2,500	4,000
1969	 23,000	3,000	7,000
1970	 20,000	3,000	9,000

- NOTES:- (a) It is considered that had outside directors been employed the cost of directors' remuneration would have been 4/5ths of that actually charged.
 - (b) Trading profits are before charging directors' remuneration, any appropriations or crediting investment income.
- 11. Mr. Perera, your client, has been offered the whole of the Preference Shares and a large block of Ordinary Shares carrying a controlling interest in Manufacturing Ltd., a private limited company, whose Balance Sheet as on 31st March, 1961, was as follows:-

BALANCE SHEET AS ON 31ST MARCH, 1961

	Rs.	Rs.		Rs.
Capital-Authorised and			Fixed Assets	
Issued 7% Preference			Freehold property	
Shares of Rs. 10 each		25,000	at cost	50,000
Ordinary shares of			Plant, Machinery	
Rs. 10 each		100,000	and Equipment at	
Capital Reserve		10,000	cost less depreciation	45,000
Revenue Reserves			Motor Vehicles at	
	15,000		cost less depreciation	12,000
Profit and Loss				
Account	10,000	25,000		107,000

(000	30,000	Stock and Work in		
6,000				32,000
		Investments at cost		25,000
		Debtors		28,023
11,167	17,167	Balance at Bank		15,144
	207,167			207,167
			Stock and Work in progress Investments at cost Debtors 11,167 17,167 Balance at Bank	Stock and Work in progress Investments at cost Debtors Balance at Bank

Other relevant particulars are as follows:-

(1) 7001	0.1 0: 1		175.
(1) The open market values	of the fixed	assets are-	
Freehold Property			 60,000
Plant, Machinery and	Equipment		 50,000
Motor Vehicles	• •		 10,000

- (2) Investments comprise government securities which carry interest at 3 per cent per annum and are quoted at par.
- (3) The profits and ordinary dividends for the past 4 years are as follows :-

	Profits	Ordinary Dividends
	Rs.	%
1958	 52,000	ĺŎ
1959	 57,000	10
1960	 59,000	12
1961	 60,000	15

The profits have been arrived at after charging all expenses including depreciation and directors' remuneration, and crediting interest on investments. Preference dividends have been paid in all previous years and provision has been made in the above Balance Sheet for both the preference and ordinary dividends for 1961.

(4) There is no basis for valuation of shares laid down in the Company's Articles of Association and Mr. Perera seeks your advice concerning the offer.

You are required to write a report to Mr. Perera:-

- (a) Outlining the main factors which you would take into consideration in arriving at a decision on this offer, and
- (b) Set out your computation of a fair price for each type of share on the basis of the information supplied, and making any other assumptions which you consider necessary. (ICAC Final 12/61)

De

- 12. The following assets were owned by the companies indicated, on their respective balance sheet dates.
 - (1) A whole life assurance policy on the life of its managing director taken out and maintained by A Ltd., for its own benefit.

(2) The interest of B Ltd. in a machine (cash price Rs. 5,000) hired to it under a hire purchase agreement giving an option to B Ltd. to purchase the machine for Rs. 0/50 at the end of three years.

- (3) An annuity of Rs. 1,000 for the lifetime of A. L. Tenant, secured on the income of a large trust fund, the annuity having been purchased by C Ltd., a finance company, for Rs. 10,000.
- (4) 90 acres out of 100 acres of agricultural land purchased for Rs. 50,000 by D. Ltd., estate developers. The company had obtained planning permission for the erection of 576 houses on equal sized plots, and for an hotel and parade of shops, together occupying 4 acres of land. By the balance sheet date, D. Ltd. had sold the 4 acres allocated for the hotel and shops to another development company for Rs. 20,000 and 36 house sites to private buyers.

You are required, in relation to each of the assets referred to above:-

- (a) to suggest a satisfactory basis or bases on which the asset might properly be valued in the balance sheet of the company concerned, and
- (b) to indicate the principle or principles on which each suggested basis is founded. (ICA Final 5/64)
- 13. The directors of Crisco Ltd. and Crunchy Ltd., biscuit manufacturers, have decided to enter into a business merger. Crisco Ltd. has prospered in recent times but Crunchy Ltd. has experienced adverse trading conditions during the past two years due to poor management which it is felt can be overcome through such a merger.

The summarised balance sheets of the two companies as on 31st March, 1969, are as follows:-

Crisco Ltd. Rs.	Crunchy Ltd. Rs.		Crisco C Ltd. Rs.	Ltd. Rs.
Share Capital		Fixed Assets		
Authorised, Issued		Goodwill	_	10,000
and fully paid:		Other assets, at		
6% Preference sha-		cost less		
res of Rs. 10 each 200,00	00	depreciation:		
Ordinary shares of		Freehold land and		
Rs. 10 each. 800,00	00,000	Buildings	420,000	165,000
		Plant and		
		Machinery		240,000
1,000,00	00 300,000	Motor Vehicles	67,000	50,000
General Reserve 420,00	5,000	Investments, at		
Profit and		cost (Market		
Loss account 73,00	00 20,000	value Rs. 25,000)	30,000	
6% Debentures		1	,133,000	465,000
(secured) —	100,000			

Current Liabiliti including pref and ordinary dividends Bank overdraft	erence	120,000 40,000	Current Assets Stocks Debtors Balance at Bank	331,000 170,000 165,000	
	1,799,000	585,000		1,799,000	585,000
		Control of the last of the las		THE REAL PROPERTY.	

(1) The assets of the two companies have been independently valued, on similar bases, as follows:

	Crisco Ltd.	Crunchy Ltd.
	Rs.	Rs.
Freehold Property	 530,000	170,000
Plant and Machinery	 690,000	200,000
Motor Vehicles	 95,000	60,000

- (2) A provision of Rs. 10,000 is to be made in the accounts of Crunchy Ltd. against doubtful debts.
- (3) The net profits (after charging all expenses, including interest on debentures, and after taking into account the income from investments), for the past three years are as follows:

	Cri	sco Ltd.	Crunchy Ltd.
		Rs.	Rs.
31st March, 1967		159,000	64,000
31st March, 1968		180,000	40,000
31st March, 1969		225,000	20,000

- (4) The investments of Crisco Ltd. have provided an income of 5% on cost.
- (5) For purposes of valuing goodwill, 10 per cent on net assets is regarded as a fair commercial rate of return in businesses of a similar nature.

From the information given above, and subject to any further assumptions you consider necessary, you are required to write a report to the directors:-

- (a) suggesting three methods by which the proposed merger may be carried out and,
- (b) recommending, with reasons, the most suitable scheme for the merger of the two businesses. Ignore taxation.

(ICAC Final 12/69)

14. The directors of Hardluck Ltd., which has suffered from adverse trading conditions in the past, are hopeful of making reasonable profits in the future. They now wish to carry out a satisfactory reorganisation scheme which would stabilise the financial position of the company and enable dividends to be paid out of current profits.

The latest Balance Sheet of the company is summarised as follows:-

BALANCE SHEET AS ON 31st DECEMBER, 1964

	Rs.	Rs.	Rs.	Rs.
Capital, Authorise	ed		Fixed Assets	
and Issued			Freehold land	
30,000 8 per cent			and Buildings	200,000
Cum. Pref. share	S	300,000	at cost Plant and machi-	300,000
of Rs. 10 each		300,000	nery at cost less	
50,000 ordinary shares of			depreciation	220,000
Rs. 10 each		500,000	Motor vehicles	220,000
No. 10 cach			at cost less	
		800,000	depreciation	40,000
			Patents at cost	20,000
Deduct adverse				
balance on Profi	t			
and Loss accoun	it	300,000		580,000
•				
6		500,000	Shares in subsi-	
Current Liabilitie	S		diary company	100 000
Tunda Cuaditana	200 000		at cost	100,000
Trade Creditors Bank Overdraft	280,000		Current Assets Trade Debtors 200,000	
(secured)	320,000		Stock 200,000	
(secured)	320,000	600,000	510ck 200,000	420,000
				120,000
		1,100,000		1,100,000

The following information has been provided:-

- (1) The preference dividends are in arrears since 1st January, 1961. In a winding up, the Preference shareholders are entitled to repayment at par together with any arrears of dividend, whether declared or not, in priority to all shareholders and to no further participation in assets. Preference shares also carry an equal voting right if the preference dividend is six months in arrears or on resolutions for reducing the capital or winding up the company.
- (2) It is anticipated that future profits will amount to about Rs. 125,000 per year.
- (3) Freehold land and buildings were professionally valued as on 31st December, 1964 at Rs. 400,000. It has been decided to write off Patents, and the shares in the subsidiary company were to be reduced to the market value of Rs. 70,000.
- (4) Preference shares of similar companies are at present quoted to yield 6 per cent.

You are required to submit a report to the directors :-

- (a) recommending, with reasons, a suitable scheme for the elimination of lost capital; and
- (b) outlining the procedure to be followed to carry your proposals into effect. (Ignore taxation) (ICAC Final 6/65)
- 15. Write short notes on the following:
 - (i) Consequential loss insurance
 - (ii) Averaging
 - (iii) Public liability insurance.

SUGGESTED ANSWERS

1. (i) High gearing means that assets are financed mainly by loan capital such as debentures and overdrafts, and not so much by share capital and retained reserves.

Example:

BALANCE SHEET

	Rs.		Rs.	Rs.
Ordinary share capital	100,000	Fixed assets, <i>less</i> depreciation		500,000
Preference share capital	100,000	Current assets	450,000	200,000
Capital & revenue reserves	150,000	less current	,	
		liabilities	100,000	350,000
	350,000			220,000
8% Debentures	500,000			
	850,000			850,000
				050,000

(ii) The debt/equity ratio is the ratio of long term debt (i.e. debentures and other long term liabilities) to the share capital and reserves. Strictly, preference capital should not be included as "equity", but it is often so included for the purposes of this ratio.

In the Balance Sheet above, the debt/equity ratio would be taken as $\frac{500,000}{350,000} = 1.43$ (This is higher than the "norm" of 1.0).

(iii) Hidden gearing refers to the practice of leasing, renting or hiring assets instead of purchasing them outright from long term loans (such as mortgages). Instead of paying loan interest, the firm pays rentals. This is a form of gearing because the firm has to pay the rental whether or not it makes a profit in the same way as it would otherwise have to pay interest.

It is "hidden" because the asset and the liability do not appear on the face of the Balance Sheet. Before making any long term loan to a company it is important to ascertain what fixed rental and interest charges the company is already committed to, as a high level of fixed charges is more difficult to meet from a fluctuating profit.

FIRM WITH NO CHARING

£G.		150,000	50,000		200,000		30,000		0.011
O BUILDIN EARING		100,000	50,000			d year		ad year	2 + 1
Rs. 100,000	Balance Sheet	Fixed assets Current assets	Less: current liabilities			account-goo	Net profit* (before rentals)	ss account-b	
SAME FIRM WITH RS. 100,000 BUILDING FINANCED BY HIDDEN GEARING	Balanc	100,000			200,000	Profit and Loss account-good year	Rentals paid 10,000 Net profit* Ordinary (before dividend 20,000 rentals)	Profit and Loss account-bad year Net profit*	10000
SAME FII FINAN		Ordinary shares Reserves				Pro	Rentals paid Ordinary dividend	Profit and Loss account-	
		150,000		50,000	200,000				
		100,000	50,000			year	20,000	year	000
FIRM WITH NO GEARING	Balance Sheet	100,000 Fixed assets 100,000 Current assets	Less: current liabilities		200,000	Profit and Loss account-good year	Net 20,000 profit*	Profit and Loss account-bad year	4.000
FIRM WITH	Bala				200	Profit and		Profit and	
11415		Ordinary shares Reserves	Digitized	by No	oolaham	Found	Ordinary	Ordinary	

*It is assumed that in a good year the firm earns 10% on the net assets under its control (both owned and rented), and in a bad year, 2½% Rentals on the Rs. 160,000 building are assumed to be Rs. 10,000/year. This fixed charge makes the equity profit much more variable and in a bad year turns it into a loss.

7500

(before rentals)

Rentals paid 10,000

5,000 Profit*

dividend

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2. (a) The following factors affect the timing of a funding operation.

- (i) the fluctuation in long term interest rates. The company aims to raise finance at low cost since it will have to pay interest at the issue rate throughout the term of the security. If for instance, the current yield on similar securities is 9%, but this is expected to fall, it would be worth delaying the issue, and vice versa.
- (ii) the availability of funds in the market. If a large issue has just been made, funds will be in short supply, and interest rates are likely to be high and prices low. The best time would be as long as possible after the last major issue.
- (iii) the degree of confidence felt by the investing public and institutions. It would be unwise, for instance, to make an issue just before an election.
- (iv) the urgency of the need for long term funds. If the bank is pressing for repayment and alternative short term finance is not available, the company may be forced to make a long term issue earlier than it would choose.
- (b) The form of the offer depends on the following factors:
 - (i) the company's debt/equity ratio. If this is low, it may be possible to raise further debt capital, which is cheaper than equity.
 - (ii) debentures can be issued only if suitable security is available, e.g. immovable property, not previously charged, or if the company has a stable profit record and good prospects.
 - (iii) stability of profits. Profits must be sufficiently stable to pay the debenture interest even in bad years and, if possible, avoid cutting the equity dividend.
 - (iv) relative costs, both interest cost and issue costs of ordinary shares, preference shares and debentures. The effective interest cost of debentures is low because debenture interest can be charged against the profit for tax purposes.
 - (v) inflation. If inflation is expected to continue, the ordinary shareholders gain, while the debenture-holders (whose right to repayment is fixed in money terms) lose.
 - (vi) preservation of control by existing shareholders. This may be protected by a rights issue, but if rights are not taken up by existing shareholders, i.e. they are sold to new shareholders, control may be diluted. An issue of preference shares or debentures normally preserves control provided the preference dividend or debenture interest can always be met.
- 3. Board of Directors, Pekoe Tea Co. Ltd.

Address Date.

Acquisition of Dimbula tea estate

- 1. It is noted that your Board wishes to retain the benefits of the past expended profits. To achieve this object it is essential that you capitalise the accumulated profits before raising any new capital. For this purpose, we recommend that the balance of Rs. 500,000 to the credit of the Property Development account be capitalised and utilised for making a bonus issue of one fully paid ordinary share for every two now held. The new capital of the company will then be Rs. 1,500,000, which covers in full the book value of fixed assets.
- 2. The amount of outside finance to be raised for acquiring and working the above estate is Rs. 1,600,000 as follows:-

Cost of acquisition, including legal Working capital required	and other expenses	Rs. 1,800,000 300,000
		2,100,000
less Pekoe cash available from fixe at bank, leaving Rs. 400,000 net	d deposit and balance t working capital	500,000
Outside finance required	of the state of the	1,600,000

- 3. At present Pekoe has Rs. 2,130,000 of equity capital including reserves, and no debt capital. An issue of Rs. 1,600,000 debentures would result in a very acceptable debt/equity ratio, and would leave room for further debt if required in the future. Debentures currently cost 6% and interest is tax-deductible, so the net cost of this source of capital is 3% p. a. a very favourable rate.
- 4. The effect on the present Pekoe shareholders would be as follows:

	Rs.	Rs.
Annual profit after tax expected from Dimbula estate less 6% interest on debentures less tax Annual transfer to 10 year sinking fund for	48,000	250,000
redemption (assuming investment at a net rate of 3% p. a. compound) Loss of interest/profit on Rs. 500,000 taken from fixed deposit and balance at bank	139,000	
(assuming 3% net)	15,000	202,000
Net annual surplus into equity profit for 10 years after acquisition		48,000

After 10 years, the debentures will be redeemed and the whole of the Dimbula profit will be available to the ordinary shareholders.

5. If the Board approves the above scheme in principle, I will consult with our brokers on timing, security and other details.

Management Accountant

4. (i) Board of Directors
Modern Confectioners Ltd.

Address Date

Proposed capital issue of Rs. 180,000

- 1. The three possibilities are an issue of ordinary shares, an issue of 8% Redeemable Preference shares, and an issue of 7% Unsecured Debenture Stock 1977/79.
- 2. An issue of ordinary shares must be offered first to the existing shareholders, i.e. a rights issue. An offer of 1 new share at Rs. 12/- for every 2 shares held at present would raise the necessary Rs. 180,000. The issue price should be below the market value of the present shares so as to make the issue attractive. The current market value of shares is estimated at Rs. 15/- by capitalising the current dividend of Rs. 1/50 a share at the normal yield of 10% so an issue at Rs. 12/- gives some value to the rights. The Directors would be required to make available 9000 shares (20% of the 45,000 shares after issue) for free dealings in the market.

The cost of this source of capital would be the 15% dividend, plus the costs of issue, which would be relatively high on this small issue.

3. An issue of preference shares must also be made first to the existing shareholders. Assuming a current market yield of 8%, the issue can be made at par, or at a discount so as to provide an incentive to existing shareholders to take up the shares.

The cost would be 8% p. a. plus the costs of issue and any discount on issue. Assuming a 15 year redemption date, and investment in a sinking fund earning 5%, a further 5% would have to be appropriated from profit each year to build up a fund for redemption.

4. An issue of 7% Unsecured Debenture Stock 1977/79 may also be offered first to existing shareholders, though this is not required by the Articles. Assuming that the current market yield is 7%, the issue would be at par.

An important consideration in this case is the resulting level of gearing. An issue of Rs. 180,000 debentures would result in a debt/equity ratio of slightly over 1 to 1 (380,000: 340,000), which may be regarded as acceptable, provided the net profit will adequately cover the interest and transfer to sinking fund every year.

Annual interest on present and proposed debentures would be Rs. 24,600 and the transfer to sinking fund for redemption (assuming the present 6% loan is also a 10 year security, and assuming a 6% sinking fund investment) would be about Rs. 29,000. The anticipated profit of Rs. 95,000 covers these service charges about $1\frac{3}{4}$ times.

Another consideration is the security required, since the present fixed assets are already mortgaged to secure the present debentures. It may be possible to raise a second mortgage on the enhanced assets, or to raise unsecured debentures on the strength of the company's profit prospects.

The debenture interest is tax deductible so the net cost is far less than for share capital.

- 5. We recommend a debenture issue, subject to the security considerations above, and subject to the possible need for further loan capital at a later date. Failing this we recommend a preference share issue.
- 6. To obtain a quotation for the ordinary shares, the following steps must be taken:
 - (i) enquire of the Colombo Brokers Association, Share Sub-Committee, whether 20% of the issued share capital is a sufficient percentage to be made available to the public.
 - (ii) prepare a Prospectus or Offer for Sale for the shares to be issued, to include all the information required by the Colombo Brokers Association Bylaws (Part XII).
 - (iii) submit an application for quotation to the Colombo Brokers Association in the prescribed form and accompanied by the prescribed documents (Bylaws Part I), and fee.

We will be glad to provide any further information you may require.

Ac	ccountant	

- 5. The following sources of short and medium term finance are available to a company:
 - (i) apart from the conventional overdraft, the commercial banks provide loans of fixed amounts repayable by instalments over fixed periods. These are mainly short term, i.e. up to one year, but are now increasingly being given for the medium term of up to 5 years and even longer.

Loans may be secured on a wide variety of assets, or unsecured, being guaranteed by creditworthy firms or individuals.

Rates of interest currently vary from $8\frac{1}{2}$ to 12% depending on the purpose of the loan. Preference is given to loans for economic development, rather than consumption.

- (ii) bills of exchange backed by commercial letters of credit may be purchased by banks in order to finance imports or exports. Bills are usually for 3 months or 6 months.
- (iii) hire purchase and finance companies will provide short term finance for hire purchase of durable assets. Normally finance is provided only up to 50% or 60% of the value of the asset, i.e. the purchaser must make a deposit of the other 50% or 40%. Interest rates are quoted on the original balance outstanding, though this decreases as instalments are paid.
- (iv) suppliers provide limited credit for goods and services provided in the ordinary course of trade. Cash discounts should always be taken, but if no discount is offered for prompt payment, credit is free. Foreign suppliers provide credit for materials, parts, etc. and also for capital goods, usually at a rate of interest depending on world capital markets. These foreign exchange suppliers' credits require Government approval beforehand.
- (v) inter-company loans may be obtained from companies within the same group who have surplus cash.
 - The *need* for short and medium-term finance may sometimes be avoided (i) by leasing or hiring the necessary assets, (ii) by selling surplus assets, (iii) by selling property and leasing it back, or (iv) by running down stock and debtors.
- 6. Replacement and expansion of manufacturing capacity may be financed internally from retained profits, depreciation provisions, and reserves for replacement and expansion. These sources arise from the excess of sales revenue over the cash costs of sales. Dividends may be limited and a large part of the profits retained (ploughed back) as it is cheaper to retain funds than to distribute them and then make a capital issue later. This avoids dividend tax, the uncertainties of the capital market, and also the costs of issue.

The need for raising outside capital may also be avoided as follows:

- (i) by selling property e.g. to a property company, and leasing it back on a long lease. The sale proceeds can then be used to replace or expand manufacturing capacity. The lease rental should be less than the extra profits anticipated, otherwise the "switch" is not worthwhile.
 - One disadvantage is that the firm's debt-raising potential is reduced. Another is that tenancy rights may be lost unless the lease is carefully drawn.
- (ii) manufacturing plant and equipment may be leased, rather than purchased outright, in the same way as buildings may be rented instead of purchased. Some finance companies and

equipment manufacturers specialise in this sort of business. Usually the lease is for a a period of five years at a fixed annual rental, and is then renewable at a nominal rental. The lessee is responsible for upkeep and maintenance and has unrestricted use of the asset as though it were owned. The main disadvantage is that the cost tends to be higher than outside finance.

- 7. Sources of foreign exchange available to private firms in Ceylon are as follows:
 - (i) Development Finance Corporation of Ceylon. The DFCC provides foreign exchange loans for imported capital equipment (but not imported raw materials, components or other current expenditure). A loan is granted only after Government approval of the project for which it is required, and after full technical and financial evaluation of the project to ensure its feasibility. The term of the loan varies from 5 15 years, depending on the life of the project and its capacity to repay. Repayment is in rupees. Tangible security is not always required.
 - (ii) Asian Development Bank. The AsDB provides foreign exchange to the Government for lending through the State Mortgage Bank and other banks to tea companies for the construction and modernization of tea factories. The terms of the loan are set by the local lending institution, e.g. the SMB charges 9½% interest, and requires repayment over 15 years. Repayment is in rupees. (A valuable Government subsidy is also available on loans for this purpose).
 - (iii) Suppliers' credits. Foreign suppliers can often provide credit, either themselves, or arranged with a foreign bank (especially if the debt is insured). This is available for raw materials and other imported supplies for the short term of up to a year, and also for capital goods, for periods of up to 10 years. Interest is charged at normal commercial rates. Repayment must be made in foreign exchange.

Suppliers' credits require prior approval of the Foreign Investment Approvals Committee.

8. (a) To test whether dividends have been paid out of real capital, it is necessary to calculate whether the capital at the end of 1944, converted into 1967 rupees, has been maintained, and is fully represented by assets in the 1967 Balance Sheet.

For this purpose, the opening capital is taken inclusive of reserves, since it is reasonable to require that dividends paid 1945–67 should have been paid out of profits 1945–67, and not out of earlier retained profits.

Also for this purpose, the wholesale price index is taken as a fair index of the changing value of money.

1944 Capital (including reserves) in 1967 rupees
= 410,000 x
$$\frac{290}{100}$$
 = Rs. 1,189,000

Net assets at end 1967 must also be converted into 1967 rupees. Net trading assets may be assumed to have been acquired in 1967 at current prices and so require no adjustment. Quick resources (debtors + cash - creditors) are all monetary assets, so are always in current rupees.

The problem is on fixed assets, since these have probably been taken at historic cost, and depreciation also based on historic cost. It is not possible to convert these costs to current rupees without knowing the year of purchase of all fixed assets held at end 1967. (This cannot be calculated from the Balance Sheet figures as increases on fixed assets are net of disposals).

If we assume the following age structure, we can make a notional calculation:

	Date of purchase				
	1951	1958	1966	1967	Total
Cost (Rs. 000)	100	300	100	19	519
Dep'n to end 1967			and the second		72-0 Partan
(Rs. 000)	80	150	12	1	243
		12 -1-12-2			
	20	150	88	18	276
				() () () () () () () () () ()	
Factor to convert	290	290	290	1.0	
to 1967 rupees	150	230	280		
1967 fixed assets in					
1967 rupees (Rs. 000)	39	189	91	18	337
The state of the s					

On this basis, total assets in 1967 rupees are 337,000 + 580,000 + 1,000 = Rs. 918,000 against a required capital of Rs. 1,189,000 i.e. Rs. 271,000 of real capital has been lost.

(b) The company's obligations to the shareholders are to pay an adequate dividend on the real capital invested, and to maintain the real capital.

The above calculation suggests that real capital has not been maintained. Over 23 years, perhaps 20% has been lost.

The position appears to be worse since the loss of capital may be due to low profitability rather than to unduly high dividends. The dividend is a low percentage on the capital employed. In 1944 it was under 6% and in 1967 (on the capital employed converted to 1967 rupees) it was $7\frac{1}{2}\%$.

9. The recommendation that an amount equal to one quarter of dividends paid should be set aside for improvement and expansion implies that out of every Rs. 100 net profit after tax, Rs. 80/-should be distributed as dividend and Rs. 20/- retained within the business (ploughed back) for improvement and expansion,

This may be criticised on two grounds: (i) the dividend policy and retention policy will differ from one business to another, and (ii) the proportion of ploughed back profit is very low. A more typical ratio is 50 of dividend to 50 of plough back. This would give a dividend cover of 2. The danger of an 80: 20 policy is that the dividend could not be maintained if profits dropped more than 20%.

Dividend policy and plough-back policy must be considered together as they are complementary. Factors to be considered include the rate of dividend paid in the past, the rate expected by shareholders having regard to comparable firms, the preference of shareholders for high dividends or capital appreciation, liquidity, tax consequences, future capital needs, and access to outside finance.

10. Shareholders. Pliable Pins Ltd. Address Date

Valuation of Shares

1. Preference shares

On a dividend yield basis each share is worth $\frac{7\%}{6\%}$ × Re. 1/==1/17

However, on a liquidation basis, a share would receive only Re. 1/-. It may be expected that Stretchtwist Ltd. would liquidate Pliable Pins in order to re-capitalise at lower rates of interest and dividend. Therefore we recommend a price of Re. 1/- per share, or Rs. 20,000 for the entire holding.

2. Ordinary shares

The equity profits for the past 4 years after adjusting directors' remuneration to the level that might be paid to outside directors are as follows:

1967	Rs.	22,000
1968		21,800
1969		17,400
1970		12,800

This shows a marked downward trend. For the purposes of valuation, the future annual profit is taken as a weighted average of the last 4 years, weighting recent years more highly than earlier years, as follows:

$$\begin{array}{rcl}
22,000 \times 1 & = & 22,000 \\
21,800 \times 2 & = & 43,600 \\
17,400 \times 3 & = & 52,200 \\
12,800 \times 4 & = & 51,200 \\
\hline
10 & & 169,000
\end{array}$$

 $169,000 \div 10 = average Rs. 16,900$

Since a market return on similar shares is 10%, the value of these shares on an earnings yield basis is Rs. 169,000, plus Rs. 52,000 securities = Rs. 221,000 or Rs. $1/10\frac{1}{2}$ per share.

This may be compared with the break-up value of ordinary shares on a liquidation. If all assets realise their book values, except for Government securities which should fetch only Rs. 52,000, cash available will be Rs. 317,000, from which trade creditors, future tax and preference shareholders will be paid a total of Rs. 55,000 leaving Rs. 262,000, or Rs. 1/31 per share.

Since the break-up value is higher than the going-concern value (subject to asset values and future profits respectively), Stretchtwist Ltd. may be expected to liquidate the company. We therefore recommend a valuation of Rs. 1/31 per share.

Accountant

11.(a) Mr. Perera

Address Date

Acquisition of Manufacturing Ltd.

The main factors to be taken into consideration in deciding whether to purchase the shares offered, and if so, at what price, are as follows:

- (i) the earnings yields currently obtainable on similar ordinary and preference shares in other companies.
- (ii) the expected future profits of Manufacturing Ltd. on the basis that you acquire control, e.g. differences in profitability or in directors' remuneration.
- (iii) the net realisable value of the company's assets if the company wound up.
- (iv) any extra profits accruing to your other interests as a result of profitable trading with Manufacturers Ltd.
- (v) any surplus assets in the company which could be realised without reducing profits.
- (vi) the cash and/or shares in any other company under your control, available for paying the purchase price.
- (vii) tax and stamp duty consequences, and legal and other costs of acquiring control.
- (viii) the possibility of opposition from the directors of Manufacturing Ltd. or shareholders, or competing offers.
- (ix) the possible disadvantages of a minority interest if you do not acquire all the ordinary shares.

(b) Preference Share valuation

On the basis that current dividend yields on similar shares are around 9% the value of a preference share would be $\frac{7\%}{9\%}$ x Rs. 10 = Rs. 7/78

Ordinary share valuation

The valuation below is based on the following assumptions:

- (i) current earnings yields on similar shares are around 20%.
- (ii) expected future equity profits of Rs. 57,500/year (i.e. excluding interest on securities and preference dividend) increasing by 3% a year compound, as in the past 4 years.
- (iii) net realisable value of current assets as per the Balance Sheet.
- (iv) no extra profits accruing to your other interests.
- (v) no surplus assets.

The value of the ordinary share capital on an earnings yield basis is the present an annuity in perpetuity of Rs. 57,500 value of increasing at 3% a year, discounted at 20%. To this must be added the investment of Rs. 25,000 in Government securities. The present value (P) of an annuity of A growing at g% discounted at r% is given by $P = \frac{A a_n/r_0}{(1+g)}$ where a_n/r_0 is the present

value of an annuity discounted at $(\frac{r-g}{1+g})$ and A is the first term of the series.

.. Value of ordinary share capital

$$= \frac{57,500 \times 1.03}{1.03 \times (.20 - .03)} + 25,000$$
$$= 373,000$$

Value of one ordinary share $=\frac{373,000}{10,000} = \text{Rs. } 37/30.$

This valuation on a going concern basis may be checked against a valuation on a break-up basis:

Market value of assets
$$= 60,000 + 50,000 + 10,000 + 100,167 = 220,167$$

Prior claims of creditors, tax and pref. shares = 17,167 + 30,000 + 25,000, = 72,167

Net fund available to ordinary shareholders = 220,167-72,167 = 148,000

:. Break up value of one ordinary share = Rs. 14/80.

This is substantially lower than the going concern value, i.e. it will pay to continue in business.

Recommended value: Rs. 37/30

Accountant

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Note to students: The value of ordinary shares on a dividend yield basis is not important to Mr. Perera because, if he gains control, he can decide dividend policy himself. More relevant are the earnings out of which dividends will be paid.

- 12. (1) A whole life assurance policy on the life of the managing director should be valued in the Balance Sheet of A Ltd. at its surrender value.
 - This is its value in exchange, and can be objectively verified by the auditor.
 - (2) The interest of B Ltd. in a machine being purchased under a hire purchase agreement is legally only a hirer's interest but the legal position is merely a device by which the seller of the machine can recover it if the buyer defaults.

The economic reality is that the purchase price is paid in instalments with interest, as under a credit sale. Accountants prefer to reflect the economic reality in the books. The machine should be shown at the total of instalments paid, excluding the interest element, less estimated depreciation on the full cash price.

(3) An annuity purchased for Rs. 10,000 would be shown in the books at cost.

In theory, the value of the annuity declines as the future expectation of life of A.L. Tenant diminishes, and this may be found from life tables, but in practice the annuity would be written off in equal annual instalments over a reasonable period, as a matter of convenience.

(4) Land valuation by professional valuers is based on its estimated rental value. This annual value in perpetuity is capitalised at prevailing rates of interest. The value per acre of land allocated for housing, shops and an hotel is higher than agricultural land because the rentals are higher.

However the professional bodies do not generally favour writing up the value of an asset unless and until it is sold. One reason for this is that future rentals from houses, etc. are estimates and cannot be objectively verified by an auditor.

Therefore, D Ltd. should show the balance of land held at the balance sheet date at cost i.e. $\frac{90}{100}$ x 50,000 = Rs. 45,000.

13. Crisco Ltd. Crunchy Ltd.

Profit on net assets (excl. income Profit on net assets for

	on net assets (excl. income vestments) for last 3 years.	Profit on net assets for last 3 years.		
	Weight Product		Product	
	157,500×1 157,500	$70,000 \times 1$	70,000	
	$178,500 \times 2$ $357,000$	$46,000 \times 2$	92,000	
Weighted	$223,500 \times 3$ 670,500	26,000 × 3	78,000	
average	197,500 × 6 1,185,000	40,000 × 6	240,000	

Capitalise annual profit @ 10% (assuming this is a fair return on net assets):

10	1,975,000	$\frac{40,000}{10}$ x 100	- 400,000
add investment	25,000		- 1
Control of the Contro	2,000,000		400,000
Represented by:			
Fixed assets	1,315,000		430,000
Investments	25,000		
Current assets	666,000		110,000
Less overdraft —	2,006,000	40,000	540,000
current liabs. 306,000		120,000	
SERVICE SERVICE	306,000		160,000
Goodwill	1,700,000 300,000	une yet ook injuries Anna Steel Ferrance	380,000 20,000
Net assets	2,000,000		
Less debentures	2,000,000		400,000
preference shares	200,000		100,000
Equity assets	1,800,000		300,000
Value per ordinary share	=Rs. 22/50	Rs.	10/-
Goodwill element in abo	ve = Rs. 3/75	Rs.	0/67
Tangible assets element	=Rs. 18/75	Rs.	9/33

- (a) Assuming that the term "merger" implies complete take-over (i.e. excluding minority holdings), three methods are as follows:
 - (i) Crisco Ltd. makes an offer for all the ordinary shares of Crunchy Ltd., offering 4 ordinary shares in Crisco for every 9 shares in Crunchy (i.e. 4 x 22/50 for 9 x 10/-). If at least 90% of the shares (i.e. 27,000) are purchased, the remaining shares may be purchased compulsorily on the same terms (Companies Ordinance section 153). Crunchy then goes into liquidation.
 - (ii) Crisco makes an offer directly for the physical assets (plus organisation and personnel) of Crunchy. Since the debentures are secured, these must be taken over with the appropriate assets. The purchase price should be 430,000 (fixed assets) + 70,000 (stocks) + 20,000 (goodwill) 100,000 (debentures) = Rs. 420,000. Of this, Rs. 120,000 should be in cash to enable Crunchy to pay

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off its remaining liabilities, and the balance Rs. 300,000 can be met by issuing 13,333 ordinary shares in Crisco (value Rs. 22/50 each). Crunchy then goes into liquidation, paying off its remaining liabilities and distributing its shares in Crisco to its own shareholders in proportion to their holdings.

(iii) Crisco makes an offer for all the ordinary shares of Crunchy, consisting of 1 Ordinary share and 3 Preference shares in Crisco plus Rs. 7/50 cash, for every 6 Ordinary shares in Crunchy. This ensures that the respective goodwill and tangible asset elements are approximately equated as follows:

Goodwill:
$$(1 \times 3/75)$$
 for $(6 \times 0/67)$
= $3/75$ = $4/-$

Tangible assets:
$$(1 \times 18/75)$$
 for $(6 \times 9/33)$
+ $(3 \times 10/-)$
+ $(7/50)$
= $56/25$ = $56/-$

Crunchy Ltd. may be preserved as a wholly owned subsidiary, thus retaining its goodwill, and the cheap debenture capital.

(b) The third scheme above is recommended, provided that the full economies of scale can be realised. The offer may include a small premium to encourage acceptance. The premium may be given by increasing the cash element of Rs. 7/50 if this is thought necessary to make the offer a success, provided the acquisition of Crunchy will yield extra profits (i.e. provided the total worth of Crunchy is more than the total offer).

All schemes have the advantage that no new company is formed, thus avoiding legal costs. The third scheme has the further advantage that Crunchy is not liquidated, thus saving legal costs and also preserving its goodwill and cheap capitalisation. On the other hand, Crunchy must continue to keep separate books of account while Crisco must also prepare group accounts. The first scheme requires no cash; the second scheme requires Rs. 120,000 and the third scheme requires Rs. 37,500. The latter is well within Crisco's liquidity position.

14. (a) The net capital employed at current market values = Rs. 550,000 as follows:-

Assets per Balance Sheet* add revaluation of freehold land, etc.	••	Rs. 1,100,000 100,000
deduct reval'n of patents & shares in subsidiary deduct current liabilities	••	50,000 600,000 550,000

* assuming these are at market values except where otherwise stated.

Future return on net capital employed $= \frac{125,000}{550,000} \times 100$ = 23.9

This amply justifies continuing in business.

The total loss to be written off is as follows:

	Rs.
Debit balance on P/L account	300,000
Patents	20,000
Shares in subsidiary written down	30,000
Arrears of cum. preference dividend (4 yrs.)	96,000
	446,000
less profit on revaluation of freehold land and buildings	100,000
	346,000

This may be eliminated by writing down each Rs. 10 ordinary share to Rs. 3. However it should be possible to persuade the preference shareholders to accept some of the loss since, if the scheme is accepted, they get an immediate resumption of dividend. If the lost capital is not eliminated in this scheme, it can only be eliminated by future profits. Excluding the arrears of preference dividend, the loss is Rs. 250,000 which will take 2 years to write off. Thus the preference shareholders may get either Rs. 96,000 cash, and an immediate stream of Rs. 24,000 a year (present value @ 6% outside yield = Rs. 496,000) or (say) Rs. 96,000 in year 3, and Rs. 96,000 in year 4 (thus clearing the arrears), and Rs. 24,000/year thereafter. The present value of the latter stream is (96,000 x 0.840) + (96,000 x 0.792) + (400,000 x 0.792) = Rs. 473,500. Rs. 496,000 minus Rs. 473,500 = Rs. 22,500. This is the benefit to the preference shareholders of a capital reduction scheme. If the future profits are less than anticipated, the benefit of immediate dividends is even higher.

The ordinary shareholders have a further advantage in that they may be able to raise debenture or other capital to repay the preference shares (if necessary, winding up to do so, and then reconstructing the company). The preference shareholders would then get only Rs. 300,000 (against Rs. 496,000 present value by accepting the scheme).

A suggested scheme, therefore, is to write down each preference share by Re. 1/- (providing Rs. 30,000) and each ordinary share by Rs. 6/50 (providing Rs. 325,000).

N. B. It will also be necessary to raise further working capital in order to pay the arrears of preference dividend and improve the liquidity of the company.

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- (b) The procedure is as follows:
 - (i) Call an extraordinary general meeting of ordinary and preference shareholders and explain the position and the advantages to each class of shareholders of adopting the scheme.
 - (ii) If the scheme gets the necessary special resolution (or as required by the Articles), apply to the District Court for confirmation of reduction by presenting a petition.
 - (iii) The Court normally requires any dissenting creditor to be paid off or secured.
 - (iv) Pay arrears of dividend and make necessary book entries, debiting share capital accounts and freehold land account, and crediting P/L account, patents account and shares in subsidiary company account.
 - (v) Recall all share certificates, endorse with their new nominal values, make necessary alterations in share registers, and re-issue.
 - (vi) Register with the Registrar of Companies the order for reduction and a minute approved by the Court.
- 15. (i) Consequential loss insurance covers the trading loss which arises from reduced turnover following a fire. Generally, consequential loss policy is given only if the firm has a fire policy, and a consequential loss claim is entertained only if there is a material loss claim.

The trading loss is calculated by applying the rate of gross profit to the loss in turnover over the recovery period, and adding any costs which were incurred in order to reduce the loss of turnover. The "gross profit" in this context means the difference between sales revenue (turnover) and costs that vary more or less proportionately with revenue, i.e. contribution.

The loss in turnover is calculated as the difference between turnover in the recovery period and turnover in the corresponding period in the previous year or years. This may be adjusted onto current selling prices.

The firm must take care to cover itself for the full revenue over the full recovery period, and including all fixed costs or "standing charges" in the calculation of the rate of gross profit otherwise the claim is averaged.

(ii) Averaging means the reduction of a claim in proportion to the amount of loss deemed to be self insured. If stock worth Rs. 10,000 is insured for only Rs. 8,000, any claim for loss will be reduced by 20% since Rs. 2,000 is deemed to be self insured. Average clauses are included in most indemnity

- insurance policies. Under-insurance can arise very easily in the case of stock insurance, since the value fluctuates, and may be above the value insured at the time of loss.
- (iii) Public liability insurance indemnifies a firm against claims by the public arising out of the negligence of the firm or its employees, e.g. food poisoning claims against an ice-cream firm, accidents to visitors to the firm's premises because of defective flooring, claims against an auditing firm which failed to detect a fraud causing loss to the shareholders, etc.

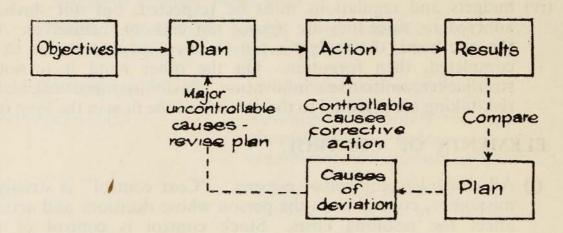
The nature of possible claims must be fully discussed with the Insurance Corporation which will then quote a premium based on their assessed probabilities and amounts. Legal costs in defending claims are also covered by a public liability policy.

SECTION VI

FINANCIAL CONTROL

6.1 MEANING AND PURPOSE OF CONTROL

"Control consists in verifying whether everything occurs in conformity with the plan adopted, the instructions issued and the principles established" (Fayol). If results are not in conformity with the plan (budget), it is necessary to understand the causes of deviation (variances) and to take corrective action so as to get results back to plan. Occasionally, it may be found necessary to revise the plan, because major uncontrollable changes in circumstances have made it out-of-date. This can be shown as follows:-



Systems theorists refer to the use of results to influence continuing action as *feedback*. In this system, information is fed back to influence current action and major re-planning, but objectives are treated as permanent and unchangeable.

Financial control is concerned primarily with the attainment of financial objectives such as profit (at low risk), liquidity and stability. From these and other objectives, period plans and budgets are developed (budgetary control) and rules and regulations are laid down to govern routine procedures (internal control). Both budgetary control and internal control are intended to ensure the attainment of objectives, and personnel must be motivated so that it is in their own interest to observe budgets and regulations. Without this motivation, a control system cannot work effectively, no matter how elaborate or detailed it is. Information is one thing; action is another.

Should an executive ever be allowed to exceed his budget, or break rules and regulations? This perennial bone of contention has no simple answer, but the following points may be considered:

(i) no plan or rule is perfect for all circumstances. It may often be better for the firm's objectives if the plan is changed, even locally by a single department,

- (ii) how competent is the executive in judging whether his action is in fact in the best interests of the organisation? In a strongly hierarchical firm very little discretion is allowed at lower levels of management and supervision. In a firm in which planning is decentralised it is more likely that re-planning and control is also decentralised. This looser rein is usually good for management development, but presupposes a climate of cooperation and acceptance of responsibility.
- (iii) in some cases, action may be approved at the necessary level in advance, but where this is impractical, deviations from budget or procedure should at least be recorded (with reasons) and reported to the responsible level as soon after the event as possible, so that any necessary correction or co-ordination can be planned.
- (iv) budgets and regulations must be respected, but not slavishly adhered to since they are means, not ends in themselves. On the one hand, the budget is not merely a paper exercise to be completed, then forgotten. On the other hand it is not a straitjacket; initiative, innovation, flexibility, and calculated risk-taking are essential to the survival of the firm in the long run.

6.2 ELEMENTS OF CONTROL

(i) All control is control of persons. "Cost control" is strictly a misnomer; control is on the person whose decisions and actions affect the resulting costs. Stock control is control of the person who orders stock purchases, and so on.

Therefore the starting point for control is to identify whose decisions affect the results, i.e. who is authorised and responsible for what?

Normally of course the managing director has authority and responsibility for the entire operations of the firm, but delegates this to divisional and departmental managers, who may in turn delegate authority and responsibility to lower level managers, supervisors, charge-hands, etc. Every person who is to be made accountable becomes a cost centre (also called control centre or responsibility centre). The I.C.W.A. defines a cost centre as "a location, person, or item of equipment (or group of these) for which costs may be ascertained and used for the purposes of cost control". It should be added that cost control depends on having a person responsible for the location, or item of equipment. A machine cannot be motivated to control its costs, but its supervisor can.

A better definition would be: "a department or other organisational unit headed by a manager or other responsible person, who is held accountable for the activities of that unit". In a large firm there will be a hierarchy of cost centres.

(ii) Standards or budgets must be set for each cost centre as a basis for comparison. When a budget has been fixed for a cost centre, it is called a budget centre and the head is a budget holder.

Each centre uses men, materials, machines and other resources, over which it has authority, and provides a certain output of work for which it is responsible. In some departments, the output is physical goods (e.g. production departments); in other departments the work output is orders received (e.g. sales departments); in many departments the output is a service to other departments (e.g. maintenance, accounting, personnel). If the amount of work may vary, it is not enough to budget the cost of resource inputs. Outputs must also be budgeted, and the appropriate cost for each level of output must be budgeted (flexible budgeting).

Some typical cost centres in a manufacturing organisation and possible measures of output are as follows:

Cost centres	Measures of output
Sales department	Revenue from orders received. Number of calls made. Number of new accounts obtained.
Store	Weight of total issues. Number of receipts and issues.
Despatch section	Weight delivered. Number of deliveries.
Cashier	Number of receipts and payments recorded.
Financial accounting	Number of ledger postings. Number of invoices issued. Number on payroll.
Cost accounting	Number of management reports issued.
Maintenance	Number of service calls.
Purchasing	Number of orders made.
Receiving inspection	Number of consignments inspected.
Personnel	Number of recruits. Number on payroll.
Training	Number of trainee-days.
Canteen	Number of meals provided.
Medical	Number receiving medical attention.

Steam

Pounds of steam.

Power house Kilowatt-hours of electricity.

Work study Number of jobs studied.

Production departments Goods produced.

Typing services Equivalent quarto pages typed.

Where work is not repetitive, and standards cannot be set, objectives may still be set, e.g. an accountant may be set such objectives as compiling an accounting manual in the coming year (in addition to his regular work), or coding spare parts for a mechanised stock control procedure. A sales manager may be set objectives such as obtaining X new accounts, or recruiting and training Y salesmen, in addition to achieving Z revenue. Each man participates closely in setting his own objectives. This is known as management by objectives, and is a control technique which frees the superior from day-to-day supervision, since the man knows that his performance will be judged to a large extent on how the objectives have been met.

(iii) actual results (inputs and outputs) are recorded and *compared* with standard for each cost centre. This may be done visually by the manager of the cost centre himself, or by the management accountant on his behalf by written report to him and to his superiors (who are also responsible).

There is sometimes a tendency to think of control solely in terms of control *imposed* from above. This should be resorted to only so far as centres are not self-controlling, as imposed control is not so effective.

A very common feeling is that the accountant who produces the figures "controls" the departments. It is the responsibility of each manager to his superior to control his own operations; accountants merely assist by providing relevant figures. If accountants give the impression that they are controlling the managers, e.g. by asking them why they have deviated from budget, the authority of their line superiors may be undermined.

Comparison should be made regularly, e.g. every month, not only at the end of the plan period, in order to detect variations from plan at an early stage and to take steps to correct them. This is called the *control period*, and should be the shortest period in which management can usefully intervene, subject to the clerical cost not exceeding the likely benefit. Scrap may be recorded and compared every hour, since excess scrap can be investigated and remedied from one hour to the next at low clerical cost. Most reports to middle management are monthly. If comparison is on a regular basis, we can compare costs from period to period as well as with budget.

Some firms measure and compare every four weeks since calendar months vary in length; even so, the number of working days in each four-week period is likely to vary and costs that depend on working time would vary correspondingly.

(iv) the difference or variance between actual cost/output and budget or standard cost/output must be analysed and understood, so that past experience can be used.

Cost accountants have developed the technique of variance analysis for production costs and revenue in great detail (see Appendix 1). Variance analysis for administration, selling and distribution, and research and development costs is not so developed.

Variance analysis is an analysis by cause. For instance, a high cost of production in a particular month may be due to an increase in materials, labour or overheads. If the increase is traced to materials, it may be further analysed between price and physical usage. A high usage may in turn be due to a number of different factors. The object of variance analysis is to pin down the ultimate causes of departure from standard in order to understand them and take corrective measures.

There can be no variance analysis without first determining standards. It is better to use standards which are agreed as reasonable by those concerned, so that variances from standard are then prima facie their responsibility. For instance, if the actual prices of materials are higher than the standard prices given (or agreed to) by the purchasing manager, then the onus of explanation is on him.

Variance responsibilities are usually assigned as follows:

Materials price — Purchasing — Production (fo

mix — Production (for stock), or Sales

yield — Production rate — Personnel

idle time — Depends on cause

efficiency in

Labour

time worked — Production

Overhead expenditure — Purchasing & user depts.

seasonal/ calendar — Self-cancelling

calendar — Self-cancelling capacity

usage — Depends on cause volume

efficiency - Production

However responsibility is not so easily pinned down since variances are *interrelated*. Low material usage may come from taking longer over the work (higher labour cost). High material usage may be due, not to the production foreman,

but to material being sub-standard – possibly the fault of purchasing (bad specification) or receiving inspection. A favourable overhead variance may be at the expense of labour or materials, and so on. Nevertheless, variance analysis is an essential first step in control.

(v) the final element in control is corrective action, also called remedial action. This expression covers both the correction of standards or the revision of the plan where necessary, and action taken by responsible managers to avoid further adverse variances, and to get back to plan. The impression should not be given that only adverse variances are of interest. Favourable variances are equally significant; managers responsible should be named and given credit, and action taken to continue and exploit favourable trends.

Corrective action is not limited to specific causes of variance; whether or not the variance is fairly attributable to a department, the corrective action may lie elsewhere, e.g. if the price of materials rises, the Purchasing Department may be required to seek a cheaper source, but it is equally possible for the Materials Controller to be asked whether the material can be purchased in bulk or on a long term contract to get a cheaper price, or for Production to be motivated to reduce scrap, or Design to redesign the product or substitute a cheaper material, or for Marketing to change the sales mix, or for a general cost reduction campaign.

6.3 CONTROLLABLE COSTS AND UNCONTROLLABLE COSTS

A controllable cost is a cost which can be *influenced* by the action of a specified member of an undertaking (ICWA). Note that complete control is not necessary. For instance, direct labour cost is a controllable cost to a production supervisor, since he has a significant influence over it, even though (i) the rate of pay may be determined by wage negotiations outside the company (ii) the amount of time taken on production depends largely on the method or process specified by Production Engineering and (iii) the competence of the operators depends largely on the Personnel Training department.

Every cost item is controllable by someone. The factory rent, for instance, may be uncontrollable from the production supervisor's point of view, but it is controllable by whoever negotiated and authorised the rental.

It will also be observed that many cost items are controllable (in the above sense) by more than one person. Direct labour cost is evidently controllable by Personnel Department, Production Engineering and Personnel Training, as well as by the production supervisor. To which cost centre should it be charged? In practice each cost item is charged to the cost centre which has the most significant influence on the amount, in this case, Production. When the variance is analysed, the separate influences can be distinguished.

In a system of standard costing, the different influences or factors affecting the cost of an item are distinguished at the outset, worked out in money terms, and each cost centre is charged with the part of the cost for which it is responsible. For instance, Personnel Department is charged with any excess of actual labour rate paid over the standard rate, and Production is charged with actual hours worked at the standard rate of pay. The method of production, and standard of training of operators, are commonly taken as fixed.

Control reports on cost centres need include only costs (and outputs) controllable by the heads of those centres. The control budgets for those centres (section 4.5) will of course show the same items, so that a line by line comparison can be made. Direct costs (costs which are wholly and directly attributable to a centre) are usually controllable by that centre, but indirect costs (overheads apportioned to a centre) are sometimes not controllable at that level, but at a higher level, e.g. the factory rent. Such items should appear in the budgets and accounting reports of cost centres that do control them, e.g. Facilities Planning Department, or the Managing Director's Office, as the case may be.

It will be remembered that cost control is not the only object of costing. The other object is profit or price analysis, which requires the separate cost of each product and program. This cuts across individual responsibilities. Long-term profit or pricing analysis requires the apportionment of costs which are common to more than one product or program. Factory rent, for instance, after being charged to the cost centre responsible, may be re-charged to cost centres in the factory in proportion to the floor space they occupy, so that a due share of rent can be included in each department's overhead cost and be charged finally to each department's production. The cost centres, apart from being centres for cost control, are also convenient pegs for collecting and re-distributing costs in their flow towards the ultimate products and programs of the firm. This analysis need not confuse the analysis by responsibility provided (i) cost centre reports clearly distinguish costs which are controllable at that level from costs which are uncontrollable apportionments from other cost centres, and (ii) the costs of each cost centre are not lost to sight by re-charging them elsewhere, i.e. credits are accumulated separately from debits.

6.4 MARGINAL COSTING

Marginal costing is the ascertainment of marginal costs, and of the effect on profit of changes in volume or type of output by differentiating between fixed and variable costs (ICWA). Marginal costing may be introduced into any cost accounting system (job costing, process costing, etc. with or without standard costing). It can also be used for planning and control in conjunction with a full costing (absorption costing) system of accounting provided fixed costs are clearly distinguished from variable costs.

Its advantages for planning have already been seen in the breakeven chart (section 4.7) which is simply a visual representation of marginal

costing, also in comparisons of different products (sections 3.19 & 4.14), in decisions to expand or contract (section 3.19) and in make-or-buy and process-further-or-sell decisions (sections 3.20 & 3.21). The marginal costing technique shows the effect on profit (our main planning objective) of any proposed change in costs, efficiency, prices and volumes (within a limited range of volume and within the short term of say one year – outside these limits, fixed costs tend to become variable).

For all short-term planning, therefore, marginal costing is an essential aid. It is dangerous, however, to use it on essentially long-term planning decisions such as setting prices, or for reviewing the adequacy of prices in recovering all costs. Many firms have set short-term prices based on marginal costs, arguing that these are the only costs of obtaining the sales revenue, then found it difficult to raise the price so as to recover fixed costs in the long term.

Control requires the comparison of actual results with budget or standard, presented in such a way that the reasons for variance (cost, efficiency, price and volume) are clearly apparent. A marginal costing form of presentation has the big advantage that volume variance is clearly distinguished from other variances whereas variance analysis on absorption costing is more complex and requires a trained cost accountant.

Example

A firm budgets Rs. 20,000 overhead per month. Budgeted capacity is 10,000 hours, so the absorption rate is fixed at Rs. 2/- per hour. In January actual hours worked are 8,000, so Rs. 16,000 is charged to production. Actual overhead cost is Rs. 20,000.

Rs. 4,000 under-absorbed overhead is carried forward to February.

The Rs. 4,000 is analysed as follows:-

- (i) Expenditure variance = actual overhead minus budgeted overhead = 20,000 20,000 = Nil.
- (ii) Volume variance = budgeted overhead minus overhead absorbed = 20,000 16,000 = 4,000 adverse.

With marginal costing, the budgeted overhead is split into total fixed costs, say Rs. 15,000/-, and variable cost per machine hour, say Rs. 5,000/10,000 = 0/50 per hour. Actual overhead is similarly split. We have Rs. 16,800/- fixed overhead and Rs. 3,200/8,000 = 0/40 per hour variable overhead. Fixed expenditure variance is therefore (16,800 - 15,000) = Rs. 1,800 adverse, and variable expenditure variance is (0/50-0/40) = 0/10 per hour favourable. Action can be taken to correct the over-expenditure on fixed costs, and to exploit and continue the saving on variable costs.

The volume is obviously 2,000 hours less than budget. It is not necessary to calculate a volume variance in rupees before taking action, but the figures can be reconciled as follows:

Fixed expenditure variance Variable expenditure variance Volume variance	0/10 x 8,000 hours 0/50 x 2,000 hours	800	adverse favourable favourable
Total variance	stand) expenses from	Nil	

This is a more meaningful and usable analysis than the analysis of variance from a fixed budget under absorption costing, and is achieved without the complications of apportioning fixed overheads, and without carrying forward over-or under-absorbed overhead. Variance analysis with *flexible* budgeting (see Appendix 1) would explain the Rs. 4,000/-variance as due to over-expenditure of Rs. 1,000, and under-absorption of Rs. 3,000/- due to low volume (2,000 hours at the fixed portion of the absorption rate, Rs. 1/50 per hour). This is an application of marginal costing principles to interpreting the results of absorption cost accounting.

A major difference between marginal costing and absorption costing is in the valuation of stock and work-in-progress. With marginal costing, stocks are valued at their marginal cost – usually direct materials, direct labour and variable production overheads only. With absorption costing, stocks are valued at their full production cost, i.e. marginal cost plus fixed production overhead. If closing stock is higher than opening stock, absorption costing results in a higher net credit to the trading account, and therefore a higher net profit. The extra profit comes from carrying forward some fixed costs (included in the closing stock valuation), minus fixed costs brought down from the previous period in the opening stock valuation. In a marginal costing system, no fixed costs are carried forward; all are treated as costs of the period and written off in that period.

Example

Marginal costing			Absorption costin	g	
Sales 100 @ Rs. 4		400	Sales 100 @ Rs. 4		400
Opening stock	Nil		Opening stock	Nil	.00
Production-variable			Production costs:		
costs 120 @ Rs. 2	240		Variable 120 @ Rs. 2	240	
less closing stock:			Fixed 120 @ absorp-		
20 @ Rs. 2	40	200	tion rate of Re. 1		
			per unit	120	
Contribution	-	200		360	
less fixed costs:			less closing stock:		
Production	100		20 @ Rs. 3/-	60	300
Selling & admin.	60	160	Gross profit	-	100
etsoo b			add fixed costs		
Net profit		40	over-absorbed		20
					120
			less selling & admin.		60
			Net profit	i pati	60

Which profit figure is right? The Institute of Chartered Accountants in England and Wales recommends (N 22, issued 1960) that "where (stock) levels are subject to material fluctuation... it may be decided to exclude (fixed overhead) expenses from stock on the ground that as they would be incurred whatever the levels of production or sales their inclusion in stock has the effect of relieving the profit and loss account in the period when they are incurred of expenses which it should fairly bear and of charging these expenses in a later period to which they do not properly relate". Also "in businesses which are highly competitive or have a sensitive market for their products, overhead expenditure may properly be omitted in order to avoid carrying forward expenditure which may prove irrecoverable". These arguments in favour of marginal costing for certain types of business were accepted by the U.K. House of Lords in a tax case (Ostime v. Duple Motor Bodies 1961) but only where marginal costing is used consistently from year to year, i.e. a business cannot easily switch from absorption costing to marginal costing.

Not all businesses should use marginal costing for stock valuation and profit determination. A business which undertakes long term contracts extending over a period of years should include fixed overheads in its work-in-progress valuation from year to year, otherwise it would show unrealistic losses in the early years and undue profit in the year of completion.

Marginal costing is used where stocks and work-in-progress will be sold in the coming year; the valuation at marginal cost represents the saving in expenditure in the coming year. This ensures that profit moves in response to sales; if sales increase, profit should also increase (assuming no change in selling prices, costs, or efficiency). With absorption costing, profit may appear to fall even though sales rise.

Example

Same firm as in last example. Accounts for year 2 appear as follows:

Marginal costing	5		Absorption costing		
Sales 110 @ Rs. 4 Opening stock 20		440	Sales 110 @ Rs. 4 Opening stock 20		440
@ Rs. 2 Production-variable	40		@ Rs. 3 Production costs:	60	
costs 90 @ Rs. 2	180		Variable 90 @ Rs. 2	180	
	220		Fixed 90 @ Re. 1	90	
less closing stock	Nil	220		330	
Contribution	0.00	220	less closing stock Gross profit	Nil	$\frac{330}{110}$
less fixed costs:	Hims		less fixed costs		
Production	100		under-absorbed		10
Selling & Admin.	60	160			100
Net profit		60	less Selling & admin.		60
			Net profit		40

With absorption costing net profit has gone down from 60 to 40, despite an increase in sales. This is not a "true and fair view", and is likely to lead to wrong decisions.

Note that the distortion arises only when there is a stock change during the period, and insofar as the stock valuation includes fixed overheads.

In this example over the 2 year period there is no stock change (it starts and returns to nil) so profit for the 2 years is the same in both systems. In practice, stock levels often continually increase, so absorption costing would continually over-state profit.

The arguments may be summarised as follows:

In favour of Marginal costing

for short-term planning and control such as:

- (i) what volume to produce and sell to achieve a target profit
- (ii) what sales mix is most profitable
- (iii) what goods (and services) should be made in the short term by the firm and which should be bought outside
- (iv) what minimum price to charge for extra sales of any product etc.
- No period costs are carried forward in the stock valuation so profit moves in response to sales.
- No need to apportion fixed costs to cost centres, to absorb fixed costs in production by an overhead rate, or to carry forward over - or under - absorbed costs.

In favour of Absorption costing

- 1. Aids management decisions 1. Aids management decisions for long-term planning and control such as:
 - (i) what plant capacity will achieve a long run target profit
 - (ii) what is the long run cost and profitability of each product
 - (iii) what goods (and services) should be made in the long term by the firm, and which should be bought outside
 - (iv) what minimum price charge for ordinary sales of each product
 - Stock is valued at nearer its true (market) value.
 - 3. No need to split fixed and variable costs, to set up a special system, or to keep costs under review lest they change from fixed to variable or vice-versa.

6.5 INTERNAL CONTROL

Internal control is control by *management* on its own operations. External control is control exercised by agencies external to the organisation, such as the external auditors.

Internal control is control on organisation and procedures – who does what and how? – whereas budgetary control is control on the inputs and outputs over a defined period. Internal control in the widest sense includes budgeting, accounting and reporting procedures.

"Internal control comprises the plan of organisation and all the co-ordinate methods and measures adopted within a business to safeguard its assets, check the accuracy and reliability of its accounting data, promote operational efficiency and encourage adherence to prescribed managerial policies" (American Institute of Accountants).

Internal control is valuable insofar as it assures the attainment of the objectives of the organisation. The general objective of efficiency requires preservation of assets from loss, provision of reliable data to decision makers, and adherence to policy.

A term that is commonly confused with internal control is "internal check." "By internal check is meant the checks on day-to-day transactions which operate continuously as part of the routine system whereby the work of one person is proved independently or is complementary to another, the object being the prevention or early detection of errors or fraud" (Institute of Chartered Accountants in England & Wales). Thus internal check is one element or aspect of internal control.

Another term is "internal audit". "Internal audit is a review of operations and records, sometimes continuous, undertaken within a business by specially assigned staff" (Institute of Chartered Accountants in England & Wales). The purpose of this review is to assist all levels of management in exercising their control function. Internal audit staff have an advisory responsibility: this is an aid to line management but does not affect their primary responsibility for effective control.

The definition of internal control, and the role of internal audit, have expanded in the last decade. Traditionally, the internal auditor has been identified with controls of a restrictive nature, such as proper control of expenditure at source, safeguarding the assets, and encouraging adherence to prescribed managerial policies.

American industrialists were among the first to use the internal auditor to improve managerial control, especially in large organisations with many levels of responsibility. His terms of reference were enlarged to include the appraisal of the control systems themselves. Instead of merely detecting and reporting stock deficiencies, the internal auditor can review the stores organisation and accounting system and report on its adequacy for preventing or minimising deficiencies. Besides counting cash balances, the internal auditor can study and report on how to reduce balances, which tie up capital and cost interest. Besides

checking the bank reconciliation the internal auditor can consider whether the system of dealing with cheques gets them into the bank quickly, again to save interest. Instead of confining himself to vouching purchases of petrol and other consumables, the internal auditor may be advising line managers to set up standards of usage, e.g. X gallons a week per vehicle, or Y miles per gallon.

It is not properly the internal auditor's job to take stock, verify assets or set up standards or procedures himself: this is the line manager's responsibility with the staff assistance of the organisation and methods department. However, in the absence of competent O & M staff, it is usually more important to get effective controls working as soon as possible than to preserve the internal auditors' strict independence.

Elements of Internal Control

1. Planned organisation, i.e. *location* of authority and responsibility before the event, including authority to commit the organisation, to record transactions, and to have custody and make disbursements of cash, stores and other assets.

2. Division of authority:

- (i) a person with authority to commit the organisation should be accountable for the exercise of this authority, and therefore should not have access to the records by which he is made accountable.
- (ii) a person having custody of assets (cashier, storekeeper, etc.) should be accountable for those assets, and similarly should not have access to the records by which he is made accountable. For instance, a storekeeper may keep his own stock records, but his stocks should be checked against records verified from independent sources (goods received notes, stores requisitions, etc.)

Similarly, a cashier keeps a cash book, but the control of cash is by reference to vouchers from independent sources. Note that a counterfoil receipt made out by the cashier for cash on account of goods or services supplied is not an independent record: control in this case is by reference to the bill or invoice issued. Therefore the cashier should not have access to the sales invoices or revenue ledger.

It is often said that no one person should have such control of all phases of a significant financial transaction as to be in a position to commit an irregularity and conceal it without collusion, e.g. if the man who prepares the wages sheets also draws the cash, he has many opportunities for fraud.

This principle applies mainly in the segregation of accounting and custody. Clerical jobs should not be unnecessarily subdivided where there is no risk of fraud because, by reducing work to a boring routine, the risk of error is increased. It must be remembered that elaborate systems of internal check are not the *only* security measure an accountant can use. Improved morale or discipline can do the job as well or even better. Another important consideration is the amount of work performed. Errors may be reduced by cutting out unnecessary work and duplication of effort.

3. Managerial *supervision* and reviews to ensure that standard procedures and policies are being followed and that plans and budgets are executed.

Each manager is responsible for reviewing and appraising his own control systems and procedures, and remedying faults revealed.

An internal control questionnaire (ICQ) is a list of questions devised to reveal faults in his procedures. The manager devises the ICQ with staff assistance from the internal audit section, and/or external auditors.

Appendix 2 gives ICQs for typical departments in a trading enterprise. It should be emphasised that every department, branch or section is different and needs a "tailor made" questionnaire. Questions should be answered by the managers, supervisors, section heads, etc. carefully distinguishing laid-down procedures from actual procedures followed, and then checked and reviewed by the manager, preferably with audit and O & M assistance. Practical remedies must be found to close major gaps in the system of internal control (completing the ICQ is not an end in itself).

Another approach to internal control is to chart the *organisation*, referencing each position to a job description setting out assigned responsibilities and authorities, and to flowchart the *procedures*. Charting takes a lot of time, and is often built up procedure by procedure over a period of years. It is necessary to control the time spent. If the firm has prepared organisation charts and procedure manuals, even if they are up-to-date it is still necessary to ascertain *actual* organisation and procedures, since manuals usually represent what is supposed to happen, seldom what actually happens. Under pressure of work, or when particular staff are sick or on leave, procedures often change drastically. The strength of a system of internal control is determined by its weakest link.

Control systems should be reviewed annually and after major procedural or organisational changes, and documented, i.e. written into a Procedures Manual. Financial procedures should be described in an Accounting Manual (see section 8.26), or an Accounting Section of the Procedures Manual.

6.6 MATERIAL CONTROL

Material control is the control of materials costs and related costs of the system by which material is provided of the right quantity and quality at the right time and place.

The following cost centres control these costs:

- (i) Design department is responsible for the specification of what materials go into the finished product. Designers have to consider whether cheaper alternatives such as lower grades or new plastic materials could be used, whether components can be simplified or standardised, whether dimensions can be reduced, etc. This is called value analysis or value engineering and is part of a systematic team effort to achieve required functions at the lowest possible cost.
- (ii) Production Engineering is responsible for the method of handling and processing materials during manufacture and assembly. Engineers should analyse the causes of scrap or waste material. Waste is the difference between what is paid for and what is necessary in the finished product. This includes waste at the supplier's plant; there is no need to start the investigation at the in-gate. Can scrap be reduced by minor re-design or by relaxing unnecessarily tight quality limits? by changes in manufacturing or handling methods? by recovery and re-use?
- (iii) Purchasing is responsible for sourcing raw materials, components and consumable supplies, and should work in close touch with Costing (re make-or-buy decisions), Design (can design be modified to take advantage of standard materials and components offered by suppliers?) and, above all, with suppliers. When buying for stock, the order quantity should be such as to minimise total ordering and stockholding costs (see inventory control, section 6.12). It should be remembered that the cost of materials includes the cost of hospitality, goodwill presents, commissions, etc. to the Purchasing Department. Another cost controlled by this cost centre is packing, handling and freight to the firm's plant; this should be on the Purchasing Manager's budget and not left as an "uncontrollable". Price variances may also be charged to the Purchasing Manager.
- (iv) Quality Control (Receiving Inspection) is responsible for ensuring that material received is in accordance with the quality specification ordered. If it is not, what is the cheapest way of getting the required specification? A legalistic approach might be to reject material out of hand and return it to the supplier, but this is not always the most economic approach as the extra cost to the supplier may eventually be paid by the purchaser. Alternatives are to use sub-standard but acceptable material, or to repair damage, or to separate the good from the bad by sorting or a refining process (at the supplier's expense). Where freight and handling costs are heavy, e.g. on imported goods, receiving inspection may be exercised at the supplier's plant at the packing or loading point. Large purchasers may find it

economic to go back further and work in co-operation with the supplier's quality control function throughout their production cycle.

- (v) Goods Receiving Department or Gatekeeper is responsible for checking the quantity received (sometimes this is limited to counting packages and multiplying by their presumed contents the storekeeper checks the contents) and their condition (only apparent damage is reported; technical quality is left to quality control).
- (vi) Facilities Planning is responsible for siting stores and sub-stores so as to minimise overall cost of materials handling. These are long term decisions which have a significant influence on material costs as well as materials handling cost, as reduced handling reduces damage.
- (vii) The Storekeeper is responsible for receiving, holding and issuing materials in such a way as to minimise damage, deterioration, losses by breaking bulk, evaporation and pilferage, and to minimise the associated cost of the store itself by good layout and stacking, use of equipment to reduce handling costs, good housekeeping practices, staff training in handling techniques, fire precautions, etc. Material losses in store should be charged as a stores expense against the storekeeper's budget; experience will show what percentage of loss is normal.
- (viii) Production Planning and Control is responsible for reducing material costs by requisitioning from stores only as required by a planned production program. Often material is wasted in setting up machines; this may be reduced by planning for long runs and by avoiding changes in priority, "crash" orders, etc.
 - (ix) Production departments are the users of raw materials and components. Material costs are controlled here by material usage standards laid down by design and production engineering. These standards usually allow for "normal" scrap which is an unavoidable consequence of the prescribed method of manufacture. It is necessary to monitor production continuously to ensure that any excess scrap is promptly investigated and corrected. Output rejected by quality control must also be watched. If it can be reworked, the loss of course is of labour, not material. If scrap cannot be re-cycled, and if rejects cannot be reworked, they may still be saleable, and should therefore be collected and controlled at source.

The following forms are typical management control reports on the use of materials.

Material Used in			Dept./Section, Week Ending			
Material	Qty. Used.	Std. Qty.	Saving or (Excess)	Reasons	Action Taken or Proposed	
(1)	(2)	(3)	(4)	(5)	(6)	
Form N	o. 3078		Signed	•••••	Date	

This is compiled weekly by the Cost Accounting Department for each cost centre which uses materials (mainly production cost centres), from material requisitions, material standards and production records, and sent to the foreman responsible. At this level, quantities are more meaningful than costs. The foreman fills in "reasons" and "action taken or proposed" and sends a copy to his superior.

Materials Report for Month of							
Dept/Section	Actual Usage	Std. Usage	Saving or (Excess)	Reasons	Action Taken or Proposed		
(1)	Rs. (2)	Rs. (3)	Rs. (4)	(5)	(6)		
Total							
Form No. 30	079	Signo	ed	Da	ıte		

This is summarised monthly by the Cost Accounting Department from the weekly departmental reports and sent to departmental foremen and the Production Manager. Note that price variance is not reported here as it is not the Production Manager's concern.

PRODUCTION COSTS FOR MONTH OF									
Product	Qty.	Actual Cost	Std. Cost	Saving or Excess Rs.	Matil	La- bour Eff'y Rs.	O'head volume Eff'y Rs.	O'head	Comment
(100 m) (100 m)									
							12107		
TOTAL				ı					
Form No	. 3080)		Signed				.Date	

This is prepared by Cost Accounting Department from materials, labour and overhead reports analysed by product, and sent to the Production Manager and General Manager. Only variances within the Production Manager's control are included in this report.

- (x) Packing and Despatch also affect material costs not only by their use of packing materials, vehicle fuel and oil, etc. but also by the care with which the finished product is handled and protected from damage in transit.
- (xi) Accounts payable are responsible for ensuring that only materials ordered and received are paid for, that the payment discharges the liability, and that double payment is not made.

Adequate records must be kept of all materials movements from receipt at the gate to despatch in the finished product so that all material paid for is also accounted for by cost centre (see also accounting systems, section 8.19).

6.7 LABOUR CONTROL

Labour control is control of wages, salaries and other remuneration and related costs of labour for the system by which labour services of the right quality and quantity are provided at the right time and place.

The following cost centres affect the cost of labour:

- (i) Personnel planning and recruitment are responsible for determining the personnel needs of the future organisation from the long term plan. Recruitment is like marriage: it is very easy to increase the labour force but very unpleasant to shed surplus labour. Therefore recruitment should not be for short term needs but for life, and should be evaluated on that basis.
- Materials are ordered only after determining the precise specification required, so also, personnel should be recruited only in accordance with written job descriptions.

Though every organisation needs regular transfusions of talent from outside, existing staff should not be passed over where they are able to rise to higher positions. The personnel planners should therefore liaise closely with the training department, and plan how to fill future vacancies so as to develop and use existing resources to the maximum.

The last word on recruitment and placement must always lie with the line manager who will be responsible for the new-comer's performance.

Rates of pay may also be made a personnel responsibility. Any variances between standard rates and actual rates paid are then charged to this cost centre.

- (ii) Job evaluation and wage and salary administration are responsible for determining job differences and working these out in terms of wage and salary differentials.
 - If employees feel they are being fairly treated their productivity is not hampered. Adequate pay is a "hygiene factor"; it is accepted as natural and does not provide much incentive to greater effort, but inadequate pay on the other hand, has a strong disincentive effect.
- (iii) Work Study (Industrial Engineering) department is responsible for devising methods of work that fit the workers better and are more productive, and working out standard times for standard methods. Standard times are sometimes worked out for existing (nonstandardised) methods; this is worse than useless as operators can too easily achieve the standards by small methods improvements. If standards are then tightened up, no further methods improvements will ever be suggested from the workplace.

Where jobs have not been studied before, there are big gains to be made in production (more output with the same labour) or savings (same output with less labour), but in the latter case the labour displaced should be absorbed satisfactorily elsewhere. If this is not the case, and known to be the case, insecurity will cancel out any savings. Clerical jobs yield as much savings (or more) as factory jobs. The cost of the work study department should be compared with the number of jobs studied.

- (iv) Training department's responsibility may be described as altering people so they fit their jobs better. It works closely with Personnel Planning in determining training needs, and with Work Study in training personnel in new work methods and techniques. Performance should be evaluated before and after training. In production departments, for instance, training should visibly raise productivity. Where performance cannot be measured, it is not possible to say in precise terms what difference in performance is due to training, but if the attempt is not made the training function lacks any control or feedback.
 - (v) Production Planning and Control. The difference between time worked on production and total time available per attendance records is idle time.

The latter may be due to insufficient work, insufficient instructions, breakdown of machinery, interruption to materials flow, power failure, etc. Most of these causes of idle time are within the control of Production Planning and Control, and some firms charge idle time to this cost centre.

(vi) Production departments or individual jobs or processes within production departments are the cost centres held mainly responsible for the use of direct labour. Therefore, direct wages are charged here, except for the proportion due to idle time. Overtime hours are also charged directly to jobs. Many firms split the overtime charge between the normal rate and the premium. The normal rate is charged to the job, but the premium is charged to Production Planning and Control. This is an incentive to reduce overtime, e.g. by using idle time productively.

The additional labour cost of reworking bad production is charged to the cost centre responsible.

The cost of *labour turnover* is very significant in some firms. This cost comprises the recruitment and training costs, and reduced output during training, of personnel recruited in place of personnel dismissed or who leave the firm voluntarily. It is usually difficult to say who is responsible for these costs, as personnel leave or are dismissed for a variety of reasons. However if any separations can definitely be attributed to particular cost centres, there is no reason why those centres should not be

charged with the consequences. For instance, if a supervisor promises a promotion which fails to materialise and the employee leaves in disgust, the cost of recruiting his successor could be credited to the Personnel Recruitment section and debited to the supervisor's cost centre.

The main control on the cost of direct labour is the comparison of time worked with pre-estimates or standards. Managers or supervisors of production departments are answerable for variances from standard. If supervisors do not themselves control wage rates the comparison is made on hours alone, or hours at standard rates of pay (see control reports below).

There is no doubt that in most firms, even in the industrialised nations, there is vast underutilisation of human resources, and corresponding scope for increases in productivity. In designing systems of labour cost control, a major consideration should be the possibility of improvement of standards rather than the mere attainment of standards. Experience of schemes of labour-management co-operation such as the Scanlon Plan suggest that the methods and techniques of incentive pay systems and labour cost control are far less important than the attitudes and approaches of management to labour.

Labour and Production in Dept./Section, Week Ending						
Craft/Grade /Group	Hours Worked	Prod'n in Std. Hours	Saving or (Excess)	Reasons	Action Taken or Proposed	
(1)	(2)	(3)	(4)	(5)	(6)	
Form 3120	Sign	ed	anners manuscript of the	Date	72/24/05/05/05/05/05/05	

This is compiled weekly by the Cost Accounting Department for each production department or section from attendance time records and

production records, and sent to the foreman responsible. The foreman fills in "reason" and "action taken or proposed" and sends a copy to his superior.

	Labo	ur Repo	rt for Mo	nth of	
Dept./Section (1) Total	Hrs. Worked X Std. Rate Rs. (2)		Saving or (Excess) Rs. (4)	Reasons (5)	Action Taken or Proposed (6)
Form 3121	Date				

This is summarised monthly by the Cost Accounting Department from the weekly departmental reports and sent to the departmental foremen and the Production Manager. This report is in rupees, but does not include any wage rate variance, which is not the responsibility of the Production Manager. Labour efficiency may be shown as the ratio of standard hours of production to actual hours worked, but the absolute amount of rupees saved or spent is probably more significant.

Overtime And Idle Time In Dept/Section, Week Ending									
Craft/Grade/Over			Reasons for idle time						
Group/ Individual	time Hrs.	Reasons for Overtime	Idle Time Hours	No work	No Instn's	No Setup	No Mat'ls	Mach. break down	Other
Total									
Form No. 3	122	Sign	ed			navago	Date.		

This report is compiled by Cost Accounting Department from overtime authorisations and idle time tickets for each department or section each week. These prime records will show the causes. The report is sent to the Production Planning section, the departmental foreman and his superior. A similar monthly report can be made for all production departments and sent to Production Planning and the Production Manager. Action on idle time will of course be taken by departmental foremen promptly as required; these reports show the cumulative impact each week and month, so that management can ensure that adequate action is being taken.

Overtime is shown in the same report as idle time so as to raise the question why normal time cannot be better used.

LABOUR TURNOVER FOR THE MONTH OF			Maria Park
	This Month	Year to Date	Last Year to Date
Number on Payroll at Start of Month			
Less Separations - Voluntary - Retirement/Death - Marriage/Maternity - Ill Health - Higher Wages - Better Prospects - Nearer Home - Other - Dismissal - Incompetence - Absenteeism - Other			
Add Recruited Number on Payroll at End of Month Labour Turnover Rate (Separations/Average Labour Force) Cost of Labour Turnover (Estimated) Rs.	%	%	%
Form No. 7432 Signed	Date		

This report is completed monthly by Personnel Department from personnel record cards, and reported to the Managing Director. The cost of labour turnover is the number of separations multiplied by the average cost of recruiting and training an employee.

(vii) Non-production departments also incur wage and salary costs, most of which will be indirect to production. As far as possible the output of these departments should be measured so that norms and standards can be worked out. Rough standards are better than no standards. These are used in fixing departmental budgets for control,

Attendance records must be kept to control late arrival, early departure, absenteeism, sick leave and holiday leave.

(viii) Payroll department is responsible for ensuring that all employees are paid according to the agreed pay rates and scales and that appropriate deductions are made. Any double payment e.g. due to failure to obtain a receipt, or irrecoverable excess payment, e.g. to a leaver, or loss due to wage fraud, is prima facie chargeable to this cost centre.

The ordinary costs of the department should be compared with the number on the payroll, and a standard cost per employee per week or month should be calculated.

6.8 EXPENSE CONTROL

The basic rule is that each significant item of expense should be charged to the cost centre which has the main influence on the amount of the expense. This is done on the control budget and on departmental reports of actual expenses against budget. For instance, insurance premiums may be charged to the accountant or whoever arranges insurance.

For some major service departments such as maintenance it is recognised that user departments have as much influence on the cost as the service department manager. These costs are often controlled both ways. The service department manager has to provide the service within a given budget. This may be flexed for the amount of service provided. User departments are charged with the service at standard rates, e.g. so much per hour, or so much per job. This goes against their budgets but does not relieve the service department manager's budget, i.e. the credits to the service department are accumulated separately from the debits. When this is applied to maintenance costs, it motivates production departments to look after their equipment and avoid unnecessary maintenance calls. Also it motivates the maintenance manager to keep his costs within budget.

Maintenance costs should be collected for each separate item of equipment, distinguishing preventive maintenance from planned maintenance. This aids maintenance and replacement planning. The basic data comes from returned copies of Maintenance Work Orders, detailing the parts and supplies used on a job and the number of hours it took. These costs are posted to the Asset or Equipment Register.

6.9 REVENUE CONTROL

Revenue control is as important as cost control since every rupee not received is equivalent to an extra rupee spent.

Just as costs are controlled by determining what they should be and who is responsible for them *before* they are incurred, so revenue is controlled by determining what it should be and who is responsible before it is received.

Sales revenue is budgeted by or in consultation with sales management; they are then responsible for achieving those sales, both in respect of quantities and prices. Actual sales are reported against budgeted sales and variances investigated and remedied.

The internal control on sales may be seen as a pipeline, which starts in the finished goods store, continues through debtors, and ends in the bank balance. No value should be allowed to leak out at the joints. For every requisition or despatch note bearing the signature of a person authorised to release goods (presented by the storekeeper to account for goods on his charge), there should be an invoice. Therefore despatch notes should be serially numbered and sales invoicing section should check that all numbers are accounted for. For every invoice issued there should be a corresponding debit to a customer's account, and a system of following up to ensure that it is paid. This is achieved by pre-listing invoices and debiting the total to a control account, which should be agreed independently with the customer ledger. (See sections 6.13 on debtors control and 6.15 on cash control.) Those who handle stock should have no responsibility for invoicing nor access to the sales ledgers since a misappropriation of stock might be concealed by suppressing the invoice, or sending it to a fictitious customer. Those who handle cash should also have no access to the invoices or sales ledger since a misappropriation of cash might be concealed by suppressing the ledger copy of an invoice, or by entering fictitious allowances or bad debts.

Prices should be controlled by the issue of a standard price list. No deviations should be allowed without authority. Special attention should be given to non-standard contracts.

The *terms* of sale should also be standardised, since variation in terms is equivalent to variation in price. Terms include packing, delivery, quantity discount, trade discount, cash discount and credit allowed, guarantee and after sales service.

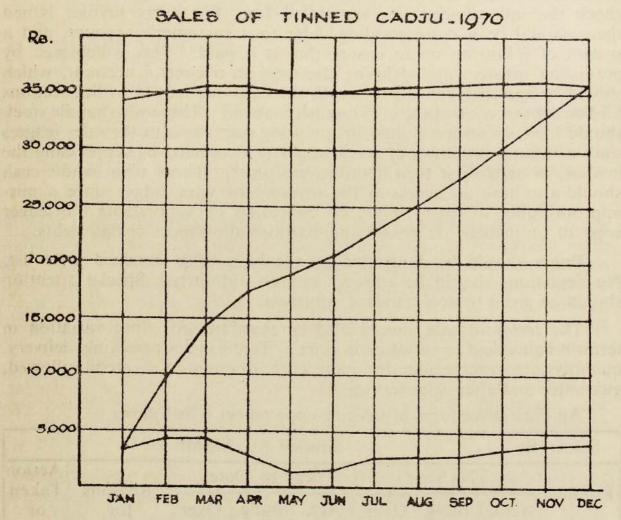
An illustrative form of sales revenue report is as follows:-

Sales	Ву			Branc	ch for	Month	of	
Product	Т	This year			r to D	ate	Reasons	Action Taken
Troduct	Actual Sales	Budg. Sales	Over or (Under)	Act. Sales	Budg. Sales	Over or (Under)	for Difference	or Pro- posed
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.		
						•		
Total								
Form N	lo. 4118			Sign	ned		Date	

This form may be compiled monthly for each sales branch by Cost Accounting department from copy sales invoices. It is sent to the Branch Manager who fills in reasons and action columns and sends a copy to the General Sales Manager.

Where sales fluctuate considerably from month to month, the variance on the year-to-date figures will be more significant.

A common form of report for showing sales *trends* is the Z chart. This shows monthly sales, year to date and twelve months to date. These data are plotted on a graph and built up over a period of a year. Usually a separate chart is made for each product, e.g.



Other sources of income should also be estimated in advance and controlled from as early a stage as possible. Sales of scrap, for instance, starts with identifying scrap quantities at the point of origin. Then the full quantity must be accounted for by adding sales and any unsold balance.

Income on investments is usually recorded in an additional column on the ledger account for each investment so that it can easily be seen whether all income receivable is duly received. Similar controls should be set up for rents receivable, and other miscellaneous sources of income such as sales of fixed assets, dividends received against bad debts (difficult to control if the bad debt has been completely written off the books), refunds of advances and insurance proceeds.

6.10 CAPITAL EXPENDITURE CONTROL

Separate control procedures are usually set up for capital expenditure since the amounts are large and have long term effects on the business. These procedures are detailed in the accounting manual (or purchasing procedures section of the general procedures manual). Capital expenditure is generally understood as expenditure on durable assets, but it may be necessary to categorise and to define borderline items. Usually the accountant's definition of capital expenditure (as distinct from revenue expenditure) is used for this purpose. Often there is a minimum limit; e.g. any item below, say, Rs. 100 is not regarded as capital. Since many assets can be rented or hired as an alternative to outright purchase, rentals should also be brought within the capital expenditure procedure.

The authorisation of capital expenditure may be retained by the chief executive, or delegated to a committee, or to divisional heads within prescribed limits. Often authorisation is in two stages: the first authority constitutes approval in principle only, but not to place orders or otherwise commit the firm. (Approval in principle means that the need is recognised, or that the proposal is within company policy, i.e. not unacceptable). This may be coupled with authority to investigate the proposal further, that is, to incur the costs of full evaluation by each function concerned, such as technical, commercial, marketing, legal and financial. This authority is given after a preliminary screening for feasibility, profitability, risk, etc. The second authority is authority to commit the firm (sanction) and to make payments within prescribed limits. This authority is given only after the proposal has been fully evaluated and has been "justified" in terms of the firm's objectives. advantage of this two stage procedure is that bad proposals are weeded out before too much time and money have gone into researching them. Also apparently good proposals are presented to higher management at an early stage, so that planning and co-ordination of projects is improved.

A standard form should be devised for proposal and authorisation. The following form is an example.

Preliminary*
Final
Supplementary

Proposal No:

CAPITAL EXPENDITURE PROPOSAL

Division/Department Originating Proposal	Name of Proposer or Co-ordinator	Replacement* /Addition	Date of submission
---	----------------------------------	------------------------	--------------------

Brief Description and Basic reasons for proposal:

(Continued overleaf)

Incremental Ex	xpenditure		remental		
(For details see	perating Total	(Omit for w	eltare or	amenity p appendix	roject)
Capital	perating Total	10.000	Cost		Total
gelsk eine e 16			Savings	1	Total
19		10			
19		19 19			
19	A SHIP WAY	19			
19 19		19			
Total		19			
Total		Total			
Alternatives cons	sidered and read	sons for reject	ion:		
What projects as	re excluded by	this project:	1011.		
Reasons for putt	ting up proposa	l at this point	in time:		
Availability of re	esources :_				
Raw materials:	sources				
Space:					
Plant and equipmed Maintenance:	nent:				
Contract services	s:				
Comment on risk		: 1 - 1 - 1	C	. 0	
If project were a	bandoned what	is residual vai	ue of ass	ets?	
Evaluation (attac	ch reports)				
Production					
Purchasing Marketing					
Legal					
Financial					
Personnel					
AUTHORISATI	ON:*		*		
Project is approve	ed/rejected/to be	e resubmitted/	may be in	cluded in	budget
Reasons:	3 , 10	(1	out final	proposal i	must be
				authorisat	
Board Minute	No:	T	Date:		
	Si	gned:			
			Secret	ary	
FORM		*Delete	as necessa	ary.	and the
No. 3371				see Prod	cedures

- N. B. (1) Originating departments are not expected to be able to make an evaluation by D. C. F. nor would they know how their proposals might be financed, or their tax consequences, nor (usually) the working capital requirements. These would be considered by the management accountant and included in his financial evaluation.
 - (2) Originating departments are required to specify alternatives. The management accountant will still search for other or better alternatives.
 - (3) Line managers are responsible for checking that physical resources will be available if the proposal is approved.
 - (4) Risk evaluation is part of the financial evaluation, but the originating department may be asked to comment.

A proposal may be authorised exactly as originally requested, or it may be varied. The amount requested may be reduced, e.g. by pruning the allowance for contingencies, or by cutting out unnecessary items, or the timetable of expenditure may be varied, e.g. by delaying the whole project or particular items. Again approval may be conditional, or special control procedures attached. It is obviously important that the exact terms of the authority are recorded and followed. Where the authority is for a number of separately detailed items, a control form should be designed so as to record amounts authorised, and actual expenditures (and perhaps commitments before expenditures) as they arise. Where the authority is for a single item, e.g. a motor vehicle, there is no problem of control; the order is placed and payment is made against the written authority.

A special control problem occurs where the firm is constructing its own assets, such as buildings, or plant and machinery. It must record for each capital project both expenditure outside and inside the firm. Outside expenditure will include payments to contractors or subcontractors, materials ordered directly for capital projects, hire of construction plant, etc. and will be picked up from invoices. Inside expenditure will include materials requisitioned from store, direct labour charged to capital projects, and overhead expenditure apportioned on the normal basis. Each project will have a code number, and all departments providing materials or services will enter this number on vouchers. If there is a large number of projects, a loose leaf Capital Project Register will be opened with one account for each project. In the general ledger a Capital Project (or Capital Work in Progress) Control account will be kept. Totals of all invoices, requisitions, labour analysis, etc. will be debited to this account regularly. As projects are completed and assets are brought into commission, an entry will be made crediting the Capital Project Control account and debiting the appropriate Asset account in the general ledger. A corresponding entry will be made in the memorandum records, closing the project account in the Project Register and opening an account in the Asset Register. The balance on the

Control account should be reconciled regularly with the detail balances in the Project Register; the balance represents a capital asset, even though not in use.

The responsibility for keeping within authorised costs normally lies on the manager who put up the proposal. For a project involving various departments, responsibility must be clearly assigned. If a project is large or especially important, one man may be made project manager with complete responsibility for the entire project, cutting across existing functional boundaries in order to make control and co-ordination more certain.

Management reports for the control of capital jobs vary widely. However it is always important to control progress as well as costs. If Rs. 100,000 is authorised for construction of a building, and Rs. 90,000 is spent, all might appear well, until it is reported that this was spent on the foundations only. Just as costs are examined with regard to progress, so progress must be examined with regard to time. Delay in executing a construction project adds significantly to its total cost, since interest on capital and other time costs are higher. Network analysis or job progress charts should always be used to control a project where the number of activities is considerable.

The following form may be regarded as an outline of a control report; details will vary in any particular case; also the format may be graphic (bar-chart, graph or network) rather than columnar:

CAPITAL EXPENDITURE REPORT FOR								
		COST	No. of Person					
Item or Activity	Actual Com- Cost to pletion Date Cost Contingency Rs Rs Rs Rs PROGRESS PROGRESS Unit Of Prog. Completion Date Completion Da						Comm -ents	
Top states to a								
estate of the laster	TENER I							
ender interes					ofa or			
a Boy on a	dame :	LI SOLI			531070	Tal Sa		
enter de la companya	Den s					HOW ES		
mind the second			<u> </u>				-	
Form No. 7084 Signed					•••••			

If it appears that costs will exceed the authorised limit, supplementary authority should be sought as early as possible. The procedure for this is substantially the same as for the original proposal. Note that the authorised limit may apply to the total only or to each separate item of expenditure (e.g. so much for desks, so much for chairs) and/or to each month or quarter. Usually some discretion is allowed in over-spending on one item against savings on another item. Also where costs cannot be estimated with accuracy, a contingency percentage, e.g. 10%, is added to the total so that supplementary authority need not be sought for insignificant over-expenditure.

It should be remembered that expenditure is only one side of any project. Money is spent only in expectation of benefits such as extra revenue or cost savings, or benefits measured in physical terms, such as meals provided by a canteen. Where possible, actual benefits should be recorded against the benefits expected by the approving authority, just as actual costs are recorded against authorised costs. Costs and benefits should also be fed back to estimators as experience for future estimates. If costs escalate, and/or benefits fall, it may not be economic to continue. Therefore projects should be kept under management review at least while costs are still being incurred.

6.11 ASSET CONTROL

Profit arises not only by sales exceeding costs but also by achieving high sales on the minimum of assets employed. This depends on two things:

(i) high capacity utilisation of assets, i.e.

hours in use hours available

and (ii) efficient utilisation, i.e.

sales revenue (or production)
hours in use

For key productive assets, standards should be laid down; actual utilisation and efficiency may be reported against standard. The difference between actual and standard should be analysed in a way that indicates what management should do.

A fishing fleet found that its trawlers were at sea only one third of the time available (33% utilisation) after allowing reasonable time for repairs in dock. On analysis this was traced to a stocking policy on spares.

A computer service bureau was heavily loaded with work, but efficiency of utilisation appeared to be low. This was found to be due to a backlog in billing.

Low utilisation may be due to shortage of demand or to various interruptions to working.

Utilisation can be improved in any of the following ways:

(i) by overtime or extra shift working;

- (ii) by more planned maintenance out of normal working hours to reduce breakdowns in working hours;
- (iii) by better maintenance facilities, inventory control on spare parts, etc. to increase the amount of equipment in commission;
- (iv) by improved production planning, supervision, incentive bonuses, etc;

Capacity can be increased also:

- (v) by substituting manual methods or other machines;
- (vi) by contracting out machine work;
- (vii) by hiring additional equipment;
- or (viii) by purchasing additional equipment.

Any shortage will be made good by the cheapest method having regard to whether the shortage is short term or long term. This may be calculated by discounted cash flow. Any surplus capacity will be left idle or rented out, or sold, whichever shows the least cost or highest profit.

A typical management report on the utilisation of plant is as follows:

Dept.	Machine or Machine	No.	0.			Analy Budge	sis of Vet (Idle	arian hrs.	ce from shown	in	red)	Stdg	C
			Available in Month	Bud- geted	Act- ual		B'down	î	1	fat'ls	Other (Specify)	cost	MMENT
1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Park		San Hall	3919			genud						
					1017		WE LOT						
	7. 61				nui!		at in						
Total	S												
Form	No. 569	7	Signed						ate				

NOTE (1) Column 5 – Column 6 = Columns 7 + 8 + 9 + 10 + 11 + 12

- (2) It is not worth providing an excessive degree of analysis on a regular basis. If idle hours due to "breakdown & maintenance" is high then this can be further analysed as "breakdown awaiting labour", "breakdown awaiting parts", and "service". The regular analysis used will depend on the factors which can be reduced by regular review. Further analysis can be made as required.
- (3) Actual hours of each machine or group are taken from time records kept by the departments responsible. As an alternative to regular time recording, actual hours may be estimated by activity sampling. This may provide data which are sufficiently accurate for control purposes at lower cost. (Many items of equipment, of course, record their usage automatically on meters).

The cost of non-utilisation in a standard costing system is given by the overhead capacity utilisation variance, i.e. the difference between budgeted hours and actual hours worked, multiplied by the standard overhead rate per hour.

The efficiency of utilisation is usually measured in terms of the physical output per hour. Output may be of goods or services. The efficiency of a powerloom workshop for instance would be measured by dividing the production of cloth in yards by the number of hours that looms were actually running (which is usually recorded by meter on each loom). Production per hour would be compared with standard or budget.

The efficiency of a fleet of lorries would be measured by comparing the revenue per hour of running time with budget or standard. Each vehicle should have a Record Book showing the time and mileage for each consignment loaded and unloaded, and also empty running.

Efficiency should be reported regularly to management (if it varies due to controllable causes). An example of a report on both efficiency and utilisation of a fleet of lorries is shown overleaf.

This report would be prepared by the Cost or Management Accountant from Vehicle Record Books and sent to the Transport Manager and his superior. Notice that output is measured in ton-miles, and is the result of multiplying the load factor (average load carried), running hours, and average speed during running hours.

In standard costing systems in which overhead is absorbed by a rate per standard hour of production, the volume efficiency variance shows the cost of working at above or below standard efficiency. If overhead is absorbed on an input basis such as labour hour rate or machine hour rate, there is no efficiency variance.

A loose leaf asset register should be kept to record details of all assets owned by the firm. It backs up the various asset accounts in the general ledger. It can serve 3 main purposes;

		COMMENT		
	g MPH	Excess or (Shortage)		
	Running MPH	Act. Bud.		
Fleet Utilisation & Efficiency for Month of	Running Hours	Excess or (Shortage)		
Efficiency fo		Act. Bud.		
ilisation &	Load Factor	Excess or (Shortage)		
Fleet U		Act. Bud.		
	Miles	Excess or (Shortage)		
	Ton-Miles	Act. Bud.		
7,17				
		Vehicle	Total	T. C. IV

- (i) a record of historic cost of each separate item purchased (or constructed) for the purpose of calculating depreciation, tax allowances, and the balance of cost in the event of disposal. Items should be grouped first by type, e.g. land, buildings, plant and machinery, furniture and fittings, motor vehicles, loose tools, etc. Within each type, items should be grouped by cost centre, e.g. machines in Department A, then machines in Department B, and so on, so that the depreciation chargeable to each cost centre may be calculated easily:
- (ii) an inventory record of the assets owned by the firm, their location and identification (e.g. brass tag number), who is responsible for their safe keeping, their physical condition, etc. for *internal control* and *insurance* purposes. This is particularly important for removable or marketable items such as tools, instruments, copper wire, etc.
- (iii) a record of who supplied the asset, period of guarantee (if any), history of preventive maintenance, breakdown maintenance and repairs, spare parts data.

This information is often kept separately by production management for planning maintenance and replacements, but there is no reason why it should not be consolidated in a single register or file.

Each separate item acquired should be shown on a separate folio (see example below). Where a number of identical items is purchased, e.g. 40 chairs, these may be entered on a single folio.

Asset Register			Item	descri	ption:	Department/location			
Insurance:			Supp	Supplier			Identification no:		
Month/Year	Vou- cher ref:	Cost & additions	Depreciation		Repa- irs and Mainte- nance	Notes	Cost Delivery Installation Total Scrap value Net cost Estimated life Annual dep'n (Net cost/life) DISPOSAL DATA: Date W/down value Proceeds Profit/Loss	Rs.	
Notes:		1		i biggi					
Form No. 53	78	outprogramme.	XVIII COLUMN						

Internal control on movable assets will include identification numbering, gate checks, handover certificates when responsibility for an asset is transferred from one cost centre to another, proper custody of keys, documents of title, etc., and independent physical verifications.

The procedure for disposal of assets is as important as the procedure for purchase. Authority to sell, scrap, transfer or write off an asset should be clearly laid down in the Procedures Manual. To prevent unauthorised transfers or appropriations, assets should only be taken out of the Assets Register on the following journal voucher form:

ASSET	DISPOSAL VOUCHER	AND PRITARIO CONTRA	C DATE OF STREET	SOCIETY CONTRACTORY
Item	Dept/Location	Ider	ntif'n No).
Authority for Disposal	Accounting	g Entries	S	of mentioners
Sell Scrap Transfer Write off insured loss Write off uninsured loss Signature Date	Original cost (Credit Asset account) Depreciation from acquisition to disposal (Debit Provision for Depreciation account) Net proceeds of sale, scrap, surcharge or insurance claim (Debit Cash) Profit or loss on disposal (Credit or Debit P/L Account)	Folio	Debit	Credit
Form No. 5379	Entries also made in Ass	et Regis	ter Foli	0

For assets of short life such as loose tools, it is not practicable to keep a separate folio for each tool. A Tools Register will be kept by Cost Accounting Department with one folio for each type of tool. Tools purchased or made by the firm will be debited into the Tools Register, and made the responsibility of the Tool Store. Tools will be issued to departmental foremen on their signature. Where tools are issued and returned daily to operators, a check system is often used. Each operator has a metal check or tag bearing his clock number. The storekeeper issues a set of tools in exchange for the check and returns the check only on return of the complete set at the end of the day. Production Control make occasional inspections to check the existence and condition of Tools needing repair are sent to the Repair Shop; the Tools Storekeeper gets the signature of the Repair Shop Manager. Tools beyond repair are returned to the Store and notified to the Production Manager, who authorises write off. If they have any sale value, e.g. as scrap metal, their sale must be arranged, and the proceeds credited against the cost of tools. Losses are investigated and written off or charged to those responsible, again on the authority of the Production Manager.

6.12 INVENTORY CONTROL

Inventory comprises (i) raw materials and components that go into the finished product (ii) supplies of materials and items that are used up in the business but which do not go into the finished product such as petrol and stationery (iii) work in process (progress) i.e. raw materials on which labour and other costs have been incurred, but not completed and (iv) finished goods ready for sale. A manufacturing firm will have all four types of inventory; a wholesale or retail trader may have only finished saleable goods.

(The American term "inventory" is preferred here to the traditional English "stock". They mean the same but "inventory" avoids confusion with stocks and shares, and includes all the above categories).

The importance of inventory is that it often represents a large proportion of the total investment in a business. A typical manufacturer may have 20% of his total capital tied up in inventory; a typical trader even 40%. The return on capital employed is significantly affected by the level of inventory held. Modern methods of control can usually reduce inventory substantially, thus reducing capital employed and improving profitability.

Moreover, reduction in inventory reduces holding costs, again improving profitability. Costs of holding inventory are as follows:

Variable costs:

Cost of capital tied up

Deterioration Pilferage Obsolescence

Cost of special packing, protection, greasing, etc. to avoid deterioration.

Insurance

Fixed costs:

Costs of space occupied (rent or building depreciation, insurance, rates, lighting, security, cleaning and maintenance)

Equipment costs (depreciation of storage racks, bins, lift trucks, pallets and other handling facilities)

Wages and benefits of storekeepers and assistants

Wages and benefits of record clerks, and stationery, files, etc.

Estimates of overall costs of holding inventory generally range from 10% to 30% of average inventory value; that is, Rs. 100,000 of inventory costs Rs. 10,000 – 30,000 a year; if it could be reduced to, say, Rs. 60,000, the variable costs on Rs. 40,000 would be saved immediately, and in the long term there would be savings of Rs. 4,000 to 12,000 a year.

It is common to find that where there is a large number of stock items, most of the value and most of the holding costs are due to a small proportion of the total number. One firm listed its stock items in order of annual usage by value, and found that 8% of the items accounted for 80% of the total value. This disproportion signifies that strict control on the few high value items will pay dividends; conversely it may be sensible to relax control on the multitude of low value items.

Inventory control like all control depends upon assigning responsibility, setting standards, and measuring performance against those standards.

Who is responsible for the level of inventory? It is usual to find that the production manager presses for higher levels of raw materials because he wants to be sure of not running out of any essential item. The purchasing officer prefers to buy in large quantities to take advantage of discounts and get favourable delivery terms, etc. Similarly, the sales manager wants ample finished goods in wide variety so that customers' requirements can always be met from stock. The result of these pressures is all one way. Therefore specific responsibility for keeping inventory to the essential minimum should be given to the Purchasing Manager or to a Materials Controller who has authority to settle conflicts of interest.

The *objective* of inventory control is to minimise the average level of inventory.

However (i) if inventory is kept at too low a level, every time demand is unusually high there will be a "stockout". In the case of raw materials, this holds up production, which may be very serious. In the case of finished goods, a stockout may lose the sale.

Also (ii) it may sometimes be economic to order in bulk in order to get a quantity discount or to anticipate a price rise or shortage, even

though this entails a higher average inventory level.

The most widely used measure of performance is the rate of stock turnover. For raw materials and supplies this is given by issues ave. balance in hand For finished goods it is given by cost of sales average balance in hand. The reciprocal of the rate of stock turnover (average balance in hand x 365) (cost of sales for the year)

gives the average residence time in days.

A high rate of turnover or low residence time of finished goods implies that goods are being sold soon after purchase or production, i.e. the average balance in hand is being sold and replaced several times a year. Each time that this quantity is sold the profit is increased by the sales margin, thus the higher the turnover the higher the return on capital. For instance, if the cost of goods sold in a year is Rs. 12,000 and the cost of the average balance of goods in hand is Rs. 1,000, the rate of turnover is 12, and Rs. 1,000 of goods is being produced and sold each month. If the profit margin is 5%, the profit on each Rs. 1,000 of goods is Rs. 50, and the profit for the year is $12 \times 50 = Rs. 600$.

Similarly, a high rate of turnover of raw materials and supplies implies that the investment in inventory is low in relation to the scale of production. This improves profitability in the same way.

What rate of turnover should be expected as a standard? The average rate of turnover of tea and rubber companies in Ceylon in 1968 was about 4. This is not a very useful standard, however, as it covers a wide range of different types of inventory. Perishable goods, for instance, will naturally have a higher rate of turnover than non-perishables, since they must be sold soon after purchase or manufacture.

A first step no doubt is to calculate rates of turnover achieved in the past and watch that current rates are no worse. However, past achievements should not be taken as standards where true standards can be set up. It is not difficult for a firm to calculate a standard rate of turnover by dividing the forecast sales (reduced to cost) by the average stock level that *should* be maintained. Stock levels are frequently excessive, so dividing by a smaller stock will show a higher target rate of turnover.

What stock should a firm carry? This can be divided into two parts – a buffer or minimum stock, and a working stock that is periodically replenished from orders:

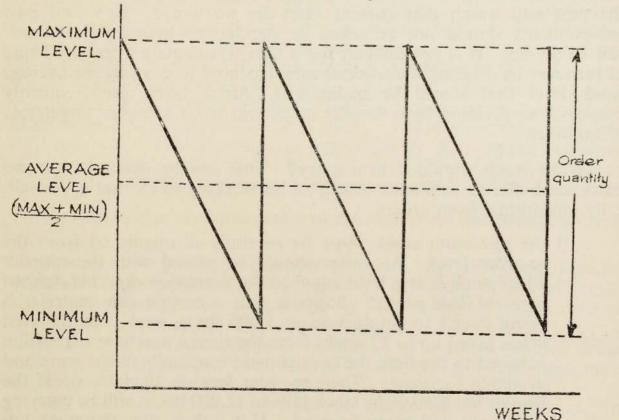
(i) the minimum stock must be carefully distinguished from the re-order level. An order should be placed with the supplier when stock is at a level equal to the maximum expected demand over the lead period. Suppose that a certain raw material is being issued to production at 1,000 lbs a week. In the past it has taken up to 12 weeks from the time a purchase requisition is raised to the time the consignment is actually in the store and available for issue. Then re-order level is 12,000 lbs. If the firm orders before the stock falls to 12,000 lbs, it will be carrying stock that will never be used. If it orders after the stock has fallen below 12,000 lbs it is risking a stockout. If a stockout would be very serious, the firm can raise its re-order level so as to allow even for the most exceptionally high demand or very late delivery. This is a matter of balancing the risk of loss against the cost of holding extra inventory.

The minimum stock is the re-order level minus the normal expected demand over the lead period. If the normal lead time above is 9 weeks, normally the firm will be down to 3,000 lbs (12,000 – 9,000) by the time the order is delivered. This is the "minimum". If stock goes below 3,000 lbs, it is a signal to management to expedite the order, but there is still 3 weeks' stock in hand to allow for the maximum expected demand.

The minimum stock covers the possibility of higher-than-average demand or a longer-than-average lead period. From this it will be seen that a longer lead period does not automatically mean a higher stock level, as is often supposed. If the

supplier gave advance warning that there would be an additional four weeks' delay the maximum lead period might be increased to 16 weeks, and the normal period to 13 weeks. The re-order level is correspondingly increased to 16,000 lbs, but the minimum level would still be 3000 lbs (16,000 - 13,000).

(ii) the working stock balance varies from the high point at which an order has just been delivered to the low point just before the next delivery. If stock is used up at a fairly even rate the average stock level is equal to the minimum level plus half the order quantity (assuming the same amount is ordered each time). Stock changes may be simplified and shown as follows:



If the above firm orders say 18,000 lbs at a time, its average stock level should be about 12,000 lbs $\left(3000 + \frac{18000}{2}\right)$

Suppose the firm expected to use 60,000 lbs in production in the forthcoming year, then it should aim for a rate of turnover of 5(60,000)

Thus we get a standard rate of turnover which can be compared with the actual rate achieved. If production is at a higher or lower level, correspondingly higher or lower stocks may be allowed, but the target rate of five times is unchanged.

The average stock level may be reduced, and the rate of turnover thereby increased, in various ways:

- (i) by comparing stock balances with expected future requirements and weeding out obsolete, surplus and damaged stocks.
- (ii) by classifying and standardising items, so as to weed out similar items under different names;

- (iii) by substituting local materials (which can be ordered in smaller lots) for foreign materials which are ordered only once or twice a year because of the high cost of ordering;
- (iv) by placing standing orders for regular supplies. N.B. The average stock level can be reduced by ordering smaller amounts more frequently. However this should not be pressed too far as the extra cost of ordering may exceed the stockholding costs saved. This is expressed in the square root formula: the economic order quantity is the square root of (twice the clerical and other costs of placing and receiving an order, multiplied by the annual demand, divided by the cost of holding one unit in inventory for a year).

In certain circumstances, *larger* quantities should be ordered, even though this increases the average stock level and reduces the rate of turnover:

- (i) to meet seasonal peaks,
- (ii) when a shortage is expected,
- (iii) when a price rise is expected (balance the extra stockholding costs against the price saving),
- (iv) where a quantity discount is offered (if it is big enough to offset extra stockholding costs).

Example:

A particular soap costs 50 cents a bar, but 49 cents for orders of 15,000 bars and over. Let the order and delivery costs of any quantity be Rs. 15, the cost of holding 1 bar for 1 year 20% x 50 cents, say 10 cents, and the expected sales demand be 20,000 bars/year.

Then Q =
$$\sqrt{\frac{2 \text{ OD}}{H}}$$
 = $\sqrt{\frac{2 \times 15 \times 20,000}{0.10}}$
= approximately 2,400 at a time.

If we order 15,000 at a time, the price reduction over a year is $20,000 \times 1 \text{ cent} = \text{Rs. } 200$. The number of orders per year falls from $\frac{20,000}{2,400}$ to $\frac{20,000}{15,000}$ at Rs. 15 an order, saving Rs. 95. Against this the average level of inventory rises from minimum plus $\frac{2,400}{2}$, to minimum plus $\frac{15,000}{2}$, an increase of 6,300. This costs an extra 6,300 x 0/10 in a year = Rs. 630. This far outweighs the savings, therefore the discount is not worth taking.

If it were worth taking, the rate of turnover would naturally be much lower and this should be taken into account in fixing a standard of performance. Suppose the minimum level is 500 bars of soap. On the 15,000 order basis, average level would be $500 + \frac{15,000}{2} = 8,000$,

instead of 500 + $\frac{2,400}{2}$ = 1,700. The rate of turnover would be $\frac{20,000}{8,000}$ = 2.5 times, instead of $\frac{20,000}{1,700}$ = 12 times.

If the discount is offered for an *order* of 15,000, but delivery and payment can be made in instalments, then the discount is more probably worthwhile. Compare the size of the instalment with the economic order quantity, and compare the cost of any increase in average inventory with savings as before.

The expression "stores control" usually refers to the arrangements for preventing and detecting physical losses of stocks and stores. The storekeeper must be made clearly responsible for security arrangements. He is checked by comparing actual physical stocks against perpetual inventory records (which must therefore be kept independently of the storekeeper). If losses are expected from evaporation, breaking bulk, etc. a normal percentage of loss may be allowed. Any abnormal loss is then the storekeeper's personal responsibility; conversely, any abnormal gain should be credited to him and carried forward against the possibility of later loss.

Where sub-stores are maintained for the convenience of outlying departments, these should be controlled on the *imprest system*. A stores imprest is similar to a cash imprest. A fixed quantity or value of stores is transferred to the sub-storekeeper, who makes issues on properly authorised requisitions in the ordinary way. No separate stores ledger or other records are necessary. At any time a spot check can be made: the balance in hand plus requisitions retained should equal the imprest. The sub-storekeeper replenishes his store regularly or as required. He takes his requisitions to the central store and receives the exact amount issued. This makes up his balance to the original imprest.

This is a very simple and foolproof method of control, which limits the maximum loss to the imprest quantity. It is not even necessary for a separate sub-storekeeper. The main storekeeper can open the substore for issues at specified hours each day. There is no loss of control in this case provided physical stock checks are made on the main store and sub-store simultaneously.

6.13 DEBTORS CONTROL (CREDIT CONTROL)

The next major asset in the Balance Sheet is trade debtors. Some businesses of course sell only on cash terms, but beyond a certain point in a competitive industry, a firm can expand sales only by offering credit. The proportion of total capital locked up in debtors varies considerably

between industries. Engineering, motor and industrial firms in Ceylon in 1968 had 24% of their total assets represented by debtors, whereas tea and rubber companies had only 3%.

The cost of holding debtors is normally less than the cost of holding inventory, but is nevertheless substantial. Costs include:

- Variable costs interest on capital
 - inflation (If the value of the rupee is declining the credit customer gets the advantage since he pays his debt later when rupees are worth less.)
 - bad debts
 - commission to debt-collecting agency (if employed)
- Fixed costs share of salaries and overheads of sales ledger and credit control personnel, and perhaps legal charges.

These might add up to 10 - 20% per annum on the average debtors outstanding.

When goods have been sold on credit, the debtor-holding costs listed above may be avoided by offering a cash discount for prompt settlement, but this should not exceed the costs saved. Very often firms offer cash discounts out of all proportion to the normal costs of holding debtors e.g. if the offer of 2% discount for payment within 10 days results in cash being received, say, one month earlier (this depends on the normal credit taken in the absence of cash discount), the firm is paying 2% x 12 = 24% per annum for the cash provided.

A possible reason for such a discount is low *liquidity*. A firm must always be in a position to pay its bills. If it has failed to ensure adequate funds, and cannot obtain an overdraft or other loan at a reasonable rate of interest, it may be forced to offer a high cash discount at least temporarily in order to liquidate sufficient debtors and put itself back in funds. Thus profit may on occasion be sacrificed to liquidity.

Another reason for long credit terms or high cash discounts is trade custom, and/or competitive pressure. Credit and other terms are part of the package offered to the customer. The package includes also price, quality, variety, delivery terms, willingness to refund if not satisfied, etc. If a firm insists on cash, while its competitors offer credit, it will lose sales, unless some other part of its package is more attractive.

Opinions differ on where responsibility for credit control should be assigned. Sales managers are primarily concerned with the level of sales, so they may give credit to high risk customers for the sake of extra sales, and lose more in bad debts. Finance managers, on the other hand, do not have the close contact with customers which would help them in assessing credit risk. Moreover, sales personnel often need very prompt answers to requests for credit; if the credit control section reports to the chief accountant delay is more likely.

In practice, credit control is more usually under the chief accountant since it depends on access to the sales ledgers. In this case there should be close liaison and good relations between credit control and sales staff.

Wherever credit control is located, it is important to define its objectives. These should be related to the overall objectives of the organisation, such as profit, liquidity and risk. It is not enough for the credit control department to keep bad debts to a minimum. It would be only too easy for the credit manager to refuse credit to all but the most creditworthy customers. However, it may be more profitable in the long run for the firm to accept orders from slightly less creditworthy customers. The art of credit control is to balance the contribution (value of order minus variable costs of meeting it) with the above debtorholding costs including the risk of bad debt.

Example:

A firm has a cost of capital of 10%, and is considering whether to produce and sell to customers (or class of customers) assessed at 15% risk:

THE PERSON NAMED IN STREET, THE PERSON NAMED IN STREET, THE PARTY OF THE PERSON NAMED IN STREET, THE PERSON NAMED			Rs.
Sales to this class of customer			100
Less: 15% bad debts			15
Net Description			-
Net Revenue expected			85
Less: variable production and selling costs, say			
60% x 100	=	60	
Less: additional administration costs on this class of			
customer, say,		15	75
		_	-
Additional profit			10

Investment above = 75

Period of investment, from incurring costs to realisation of revenue, say 6 months

$$\frac{10}{75}$$
 x 2 = 27% per annum.

This exceeds the cost of capital, therefore it is profitable for the firm to sell to such customers. (In practice, risk is rarely quantified in this way, but it is often illuminating to do so).

In developing standards for measuring credit control performance, the following factors affecting the level of debtors should be considered:

- (i) the volume of orders on account,
- (ii) the risk policy or stringency with which creditworthiness of application is judged,
- (iii) the cash discount or period of credit allowed to creditworthy customers,

(iv) the period of credit actually taken. This latter depends on the general paying practices of these customers, economic conditions such as Government credit policy, and on the rigour with which debts are pursued and collected.

The most widely used standard of credit control assumes that risk policy, cash discount and credit policy are determined, and simply relates the remaining factors, i.e. sales and debtors;

Rate of debtors turnover
$$=$$
 $\frac{\text{Credit sales}}{\text{Debtors}}$

Equally widely used is the average collection period, which is the reciprocal of the rate of debtors turnover:

Average collection period (in days) =
$$\frac{\text{Debtors}}{\text{Credit sales for the year}} \times 365$$

This gives the average number of days from invoicing to receipt of cash, i.e. the credit actually taken by customers. It may be compared with the credit allowed.

As an example, if the official credit terms are "payment within the month following the month of purchase" this means that the average customer is allowed 6 weeks' credit. If annual sales are Rs. 360,000 and debtors at the end of the year are Rs. 60,000, then the turnover ratio is $360,000 \div 60,000 = 6.0$ times.

The average collection period =
$$\frac{60,000}{360,000} \times 365 = 61$$
 days.

This implies that many customers are not paying within the allowed period.

Care should be taken in applying these ratios over short periods, since the debtors outstanding at the end of, say, a month are not related to the credit sales solely of that month, but to earlier credit sales also. Seasonal fluctuations will also affect the ratio.

The rate of debtors turnover by itself does not reveal how long debtors have been outstanding. This may be found by aging, that is, by going through the sales ledger and classifying debts according to period outstanding. An age schedule would appear as follows:

Period Outstanding	Debtors Outstanding Rs.	Percentage
Over 6 months*	1,600	1.4
3 – 6 months*	6,050	5.1
1 – 3 months	11,650	9.8
Upto 1 month	99,600	83.7
	118,900	100.0

^{*}Old debts may be individually detailed with comments.

This highlights potential bad debts for early attention, and helps in estimating the provision for bad debts. Also the percentage analysis may be watched from month to month; if the percentages of older debt increase this is a danger signal. Measures such as the percentage of bad debts to credit sales should be compared with the percentage of orders rejected to credit sales. This gives an indication of whether the standards of acceptance are too high or too low. (A 15 year analysis in the U.S. showed overall bad debts of 0.1 - 0.2% of sales. This very low percentage reflects the highly developed network of credit information, and the importance attached to credit ratings. It may also reflect the practice, now changing, of judging credit control solely on how small it keeps bad debts, even at the expense of additional sales and profit).

6.14 CREDIT ADMINISTRATION

The work of the Credit Control Department may be divided into 3 parts – credit analysis before and on receipt of order, collection of normal debts, and collection of overdue debts.

(i) The department should be so organised that prompt answers can be given to orders which request credit terms. New customers should be investigated to ascertain the limit of credit that may safely be allowed. This depends on the four C's – capital, capacity, character and conditions.

Capital refers to the size and financial resources of the customer.

Capacity to repay depends on his liquidity. His last published accounts, if not too far out-of-date, will show his current ratio (current assets to current liabilities). Orders for re-sale are a better credit risk than orders for own use, other things being equal, since they are self-liquidating. Another useful indicator is his average payment period, given by purchases ÷ trade creditors.

Character is his reputation for honesty and prompt payment. Banks, trade associations, salesmen and other sources may provide references and information, which will aid judgment. Existing customers applying for increased credit will of course be judged on their past payment record. Failure to take cash discounts is a bad sign.

Conditions refer to economic conditions generally and as affecting the customer particularly. Conditions may also refer to special conditions for doubtful customers, e.g. cash on delivery, third party guarantee, or sample orders only.

Credit limits should be written onto customer accounts in the Sales Ledger, so that a further order can be quickly granted if the outstanding debt and order together do not exceed the limit. If orders are frequent, they should be recorded in an additional column in the customer's account, and crossed off as they are invoiced. Invoices and cash receipts must be posted very promptly so that the status of accounts is correctly shown.

Another form of credit limit is the limit on monthly supplies; naturally it is still necessary to ensure that the balance outstanding does not grow.

All credit limits should be kept under continuous review.

(ii) The second job of the department is to supervise normal debt collection. The invoice normally states that the amount is now due, and payment should be made within a certain period from the date of invoice. Therefore the date of invoice should be shown in the customer's account.

For up-to-date records, invoices should be issued on despatch of goods and posted to the ledger (or filed under the slip system) as soon as possible. It is not necessary to issue statements unless there are a large number of invoices each month. If statements are issued, they should show the makeup of the balances outstanding (they may be copies of the ledger accounts), so that customers can readily check them.

Cash received should be posted from the Cash Book as soon as possible. The date entered in the customer account is the date of receipt, whereas cash discount is normally allowed if the cheque is posted (as shown by the envelope postmark) within the required period from the date of invoice. A check should be kept on discount eligibility, especially with new customers.

(iii) If an account is not paid within the prescribed credit period, it is overdue. The customer should be sent a tactful reminder, and it may be wise to hold up further supplies until the position is clarified.

The department must try to establish the reason for non-payment. Inability to pay must be treated quite differently from unwillingness to pay. If the customer is unable to pay immediately, he may yet be able to pay later, or in instalments (e.g. by post-dated cheques), and the firm may thereby retain his custom. If a customer is forced into bankruptcy or liquidation, the dividend from the forced realisation of assets may be less than might be received by allowing the customer to continue in business. Since any creditor may force the issue, it would be necessary in this case to get the agreement of all creditors.

If a customer appears able to pay, he must be progressively "needled" into paying. Again, it may be possible to retain his custom in the future if he can be induced to pay without

unpleasantness. Threats include the cut-off of future supplies, publicity, and legal action. What action is actually taken will also depend on its cost. A Rs. 100 account is not worth more than Rs. 100 of litigation.

Mention may be made here of debt collection agencies which operate in some countries. The agency posts the sales ledgers and collects debts for a percentage commission.

6.15 CASH CONTROL

Cash for our purposes here comprises:

Petty cash balances Bank current account balances Cheques in course of collection Bank deposit account balances

Closely related are marketable securities, which can be turned into cash at short notice.

Cash is the most liquid of all assets, since it can be converted into any other asset at very short notice, but it is generally unproductive itself, compared with other assets on which we expect a return. Moreover there are certain costs of holding cash, comparable to the cost of holding debtors:

Variable costs — interest on capital

inflation

insurance of petty cash, or risk of defalcation

Fixed costs — share of cash planning and cashier departments' salaries and overheads

(Bank charges are not included as they are a cost of receiving and paying cheques rather than holding a bank balance. In fact, the larger the bank balance the smaller bank charges tend to be).

If cash holdings can be safely reduced, return on capital can be improved. Before considering how cash may be reduced, we must examine why cash is held. Five reasons can be distinguished:

- (i) Receipts and payments do not occur at the same time. Typically, receipts are fairly even from sales, day by day, but payments are "lumpy". Wages are not paid continuously as they are earned, but weekly; salaries and creditors may be paid monthly, rent quarterly, and dividends and tax annually, while fixed assets are irregular lump sums. To meet these peak requirements, receipts have to be built up over a period.
- (ii) Even if receipts and payments were exactly matched, it takes a few days to get receipts credited to a bank account and available for payments. This is offset (sometimes more than offset) by the time taken for cheque payments to be cleared through the banking system, and debited to the account.

- (iii) A buffer reserve has to be kept in case there is an unexpected slowdown in cash receipts, e.g. due to a postal strike, or drop in sales, or an unplanned increase in costs.
- (iv) An "opportunity fund" may be kept to enable the firm to take quick advantage of specially profitable opportunities that may arise.
- (v) Some banks require customers to keep minimum balances in their accounts.

Petty cash balances, of course, are held because cheques are not always acceptable means of payment and to avoid the cost of drawing cheques for very small amounts.

Cash needs may be reduced:

(i) by cash forecasting. Temporary excesses of cash built up to meet large payments may be profitably invested in securities which are repayable on demand or within the period required, such as Treasury bills, tax reserve certificates, commercial bank deposits and savings bank deposits. If cash forecasts are prepared for some years ahead, suitable provision can be made for major capital payments, e.g. by a sinking fund investment. If new loans or capital issues are planned, these can be timed to provide the necessary cash; depreciation funds can then be invested in the business at a higher rate of return than from outside securities.

Cash forecasting also provides experience from which the size of the buffer reserve and opportunity fund may be judged. To some extent, it is possible to define the various contingencies and opportunities that might arise, and to assess the cash requirements. Some of these may be met (especially by a large company) by ad hoc borrowing or prearranged lines of credit; it is not always necessary to carry cash.

- (ii) by pooling cash, or centralising cash administration and transferring excesses to meet deficiencies. This requires daily reporting of cash balances to head office. Where a firm has a number of outstation branches, each with a bank account, it will be necessary to keep a sizeable balance at each account unless accounts can be promptly replenished as necessary from other accounts in surplus. Petty cash balances may also be reduced if it is possible to replenish them quickly and easily.
- (iii) by efficient cash administration, cash and cheques received from customers may be credited sooner to the firm's bank account. It is not, for instance, necessary for cheques to be held up until they have been classified or posted to the relevant account. They should be taken to the bank immediately after recording in the book of prime entry (cash book or register). This mobilises cash sooner, reducing interest on capital, and also reduces the risk of misappropriation. (See also Appendix 2, Internal Control Sections B to E).

Measures of Control

It is difficult to judge precisely how much should be held in cash. Moreover, precise calculations have a habit of being proved wrong. Cash balances are even more variable than inventory, since everything affects them. It is "better to be safe than sorry". On the other hand, it would be equally foolish to take pride in enormous balances of idle cash; the shareholder may think he could use the cash more profitably himself.

In Ceylon in 1968, 150 large companies held 8% of their total assets in cash, and a further percentage in liquid Government securities. This 8% + buffer is an average; individual firms ranged widely according to their needs.

Some firms relate their cash needs to sales, or to purchases, e.g. a firm may aim to keep a minimum cash balance sufficient for 2 weeks' purchases. It is also possible to set maximum balances, as for inventory. This is often done where branches have their own bank accounts; banks have standing instructions to transfer to the head office bank account any excess cash over the maximum.

Another control device is to isolate cash discounts receivable which were missed due to late payment. This is done by debiting all purchases at prices net of cash discount. Missed discounts are debited to a separate expense account and investigated. They may be due to slow processing of invoices, or an inadequate cash balance.

The primary control on liquidity and solvency is the *cash budget*. This should be broken down over short periods (by month or week, or even by day if funds are very short) and compared with actual receipts and payments as shown in the Cash Book (or Cash Control account where several cash books are kept). Prompt steps should be taken to meet any expected deficiency.

Liquidity ratios such as the current ratio (current assets ÷ current liabilities) and quick assets ratio (current assets other than inventory ÷ current liabilities) are not effective measures of cash management, since these are merely the ratios used by outside creditors who do not have access to the firm's detailed budget and forecast of cash receipts and payments. For instance, it is quite possible for the quick assets ratio to be less than 1:1, and for creditors to be paid in due time out of current receipts. The finance manager should have regard to liquidity ratios, especially when he is approaching banks, suppliers, etc. for short term finance, but they may prove unnecessarily restrictive as operating standards.

6.16 MANAGEMENT REPORTING

All information, accounts and reports provided to internal management, from supervisor level to the Board of Directors, for purposes of control, come under the heading of internal or management reports.

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External reports are mainly the annual accounts, balance sheet, auditors' report and directors' report provided to shareholder members and returns to the Registrar of Companies, Inland Revenue, and other Government bodies. The preparation of the annual accounts and balance sheet is the concern of the financial accountant, whereas management reports are primarily the concern of the management accountant.

In this section, we are mainly concerned with financial management reports, that is, reports including rupee data, but the principles of reporting apply equally to non-financial reports, such as production, sales and inventory in units, labour strength and turnover, market information, research and development activity, and so on. The management accountant is not of course limited to rupee data; at lower levels of management it is often better to report quantities rather than costs and revenues; these will be better understood and acted on.

In a fully integrated system of budgetary control, reports will be sent to each budget holder, showing actual results compared with budget figures in the same format and detail as the original budget. Most financial reports are monthly, but the control period could be shorter in more critical areas. Reports go not only to the level immediately responsible, but also to higher levels. Each manager wants to know the cost or revenue performance of all the departments under his control; there is a build up of reports through the hierarchy.

Examples of management reports are given in sections 6.6 - 6.11

Comparison of actual results with what was expected (standard or budget) is the cornerstone of control. Sometimes comparison is made with the previous month, or the same month last year; this is useful for detecting trends over time, but is not the best basis for control, since conditions are continually changing. The standard or budget, on the other hand, though it is based partly on past results, allows also for expected changes in conditions.

For revenue and expenditure it is useful to show both the actual results for the month compared with budget, and the actual results for the accounting year to date, compared with budget. This shows how successfully the firm is keeping to plan on a cumulative basis. Where costs or revenues fluctuate uncontrollably from month to month, only the year-to-date figures should be reported, since the monthly figures are less significant.

Again, year-to-date figures are sometimes compared also with the previous year-to-date figures, or the 12 months to date with the 12 months to the same date last year. These should be used only to reveal trends over time, not for control comparisons.

If departments, branches or divisions within the firm are comparable, their results may be compared. Properly handled, this encourages competition and improves performance.

It is far better for a management accountant to present a single comparison of actual results with budget than to present a mass of figures comparing everything with everything, which confuses the issue.

The purpose of any report is action. The value of any report lies in the difference to future costs or profits resulting from that action. Every report costs money to prepare - it is estimated that for every 1 cent sheet of paper a further 10 cents is spent on typing, writing, handling and filing - and so must be justified by its benefits. It is often possible to estimate the cash value of a report by asking what each recipient does with it, and what difference this makes or is likely to make to his controllable costs or revenues. Very often reports outlive their usefulness, but go on being produced since it is no-one's job to stop them being produced. Sometimes, recipients believe they need certain data from reports but investigation shows that they don't or that it is already available elsewhere. One Purchasing Manager said that a monthly report showing the value of orders outstanding in each purchasing section was very valuable to him as it showed the level of activity in each section. Further analysis showed that no action resulted from this, nor was the information useful, since the work load in each section depended more on the number of orders processed than on the total value outstanding. A key concept in modern management theory is management by exception. Applied to management reports, this means that the hard work of comparing items in detail is done by the management accountant; he isolates and focusses attention on significant exceptions or variances. Sometimes the level of significance is predetermined, e.g. it may be decided to report only variances which are more than 5% above or below budget, but this runs the risk of ignoring controllable variances below the threshold.

An important part of control is the use of financial or control ratios. These should be tailor-made for the individual firm (See Section 7)

To be relevant, reports must be timely. Managers need to know what has happened as soon as possible after the event (if not before) so that they can take prompt corrective action. All regular reports should be scheduled in the accounting manual, showing who is responsible for their preparation and the date that each should arrive at the user's desk. Normally monthly reports should be prepared and distributed within 3 to 5 working days after the end of each month; information systems should be set up to ensure that reporting standards are achieved and maintained. "Flash reports" may go to top management within 24 hours of the end of a period; these usually carry only key data such as production quantities and sales revenue, which are accumulated from day to day so that very little processing is required on the last day of the period.

It is not necessary for figures to be given to the last cent; figures should be rounded to as many digits as are significant to the person receiving them, usually not more than 2 or 3. For instance, if sales are Rs. 127,421 in a particular month, and they could have been 10% higher or lower, it is the Rs. 127,000 that is significant; the Rs. 421 is redundant. If clerical effort goes into determining the last Rs. 421, time is wasted. Moreover the significant figures no longer stand out. If the sales report was held up while the last few rupees were accounted for, there is a triple loss!

Accountants usually attach great value to accuracy but accuracy does not imply a cents mentality. It is most important for the management accountant to be sure of the figures he reports, but he should attach equal importance to their relevance. Irrelevant details obscure the message.

Reports should be objective, even when the reporter is partial, nor should there be distortion by omission. All assumptions which could possibly be questioned should be stated on an equal par with the conclusion. Where the reporter is not sure of his facts, he should state his sources (this does not relieve him of responsibility, however). He should sign the report or state his department so that users know its source, and can refer for further information.

Every report should be dated. If data are continuously changing, the reporter should also state the cut-off date at which the data in the report were true.

Every report should carry a clear descriptive title, as short as possible. If the report covers a month or other period, the period should be part of the title.

Form of Report

So far it has been assumed that all reports are written (or typed), but they may also be oral. A personal presentation has the advantage of two-way communication. This is frequently favoured for reporting at top management and Board levels.

The form of report chosen should be the most effective way of getting the information across, understood, and used. The reporter should put himself in the place of the user and think how he would react. Some points to be considered are as follows:

- (i) "one picture is worth a thousand words" (Chinese proverb); if possible show figures graphically, since this allows more rapid comprehension. This includes the use of graphs (natural scale and semi-log scale), and charts (bar charts, Z charts for sales, break-even charts, flow charts, pie diagrams, maps, etc.). (See any textbook on statistics presentation of data);
- (ii) write in plain language suited to the user; avoid professional jargon;
- (iii) avoid ambiguity, e.g. "net profit including debenture interest" could mean before or after deducting debenture interest;
- (iv) in a written report, state the subject matter first (unless fully explained in the title), then the principal item or synopsis of information and any underlying assumptions; supporting information should follow or be relegated to an appendix;
 - (v) design a standard format for each regular report and use it consistently;

- (vi) highlight key information or figures by entering them in red, or underlining; show all variances in a single column, circling those that are adverse;
- (vii) indent to the left greater clarity, e.g.

Gross Sales Less: Returns NET SALES

6.17 PROFIT CENTRES

A profit centre is a cost centre which incurs costs and earns revenue related to its costs. Its performance (or rather the performance of its head) is then measured by the profit budgeted and made. This simplifies control and allows a greater decentralisation of authority. In effect, the responsible head is in business for himself, and can be remunerated according to the profit he makes.

The profit centre concept has been most successfully used in very large multi-product organisations which have serious problems of control, and which can be suitably divided into semi-autonomous divisions. It is easier to control divisions this way than to control by reference to a medley of measures of performance such as cost, quality, safety, modern equipment, production volume, promptness in meeting orders, etc. etc. The profit centre concept is a powerful tool of control since most of these factors are automatically reflected in final profit. It is not necessary to assess each factor separately, and to assess the relative weight or importance to be attached to each factor.

In a non-divisionalised concern there would be only one sales department earning revenue. If other departments are to be made profit centres, each department must be credited with the value of its output, and the receiving departments debited. Therefore transfer prices are set for all products and services provided by one profit centre to another. This is done for each department or division having a measurable output, but not for service departments such as legal, or accounting. In Ford Motor Co. for instance, the Chassis Division "sells" each chassis to the Body Division at a negotiated transfer price. After adding the bodywork panels, Body Division sells the car to the Paint Trim and Assembly Division at another transfer price and so on. Transfer prices are negotiated by buyer and seller at arm's length, just like any outside prices. there is an outside market for a particular good or service, the market price may be used. In some companies, transfer prices are set centrally in such a way that the total profit is divided roughly equally between divisions, but this is unfair to a division which does more than its share of the total manufacture; it is likely to be undercut by the prices of outside competitors.

The profit centre concept implies that each centre may purchase its supplies and services either inside the company or outside the company, wherever it finds prices cheapest. This promotes cost consciousness and efficiency. If an outside supplier quotes a lower price than a supply-

ing profit centre, this should lead to a detailed comparison of costs and perhaps a cost reduction campaign. Of course, an outside supplier may quote less than full cost in order to get extra sales, but the same tactics are available to the supplying profit centre. If, however, the supplying profit centre cannot match outside prices after making every effort to do so, the Head Office can step in and instruct other profit centres to buy internally. (This assumes that the marginal or incremental costs of the supplying profit centre are less than the outside supplier's price; if the marginal cost is higher, it is better to buy outside, despite idle capacity.) This is a departure from the pure profit centre concept, but may be forced on a firm temporarily or permanently.

A further development is to divide the assets of the company and allocate them to the respective profit centres, so that the return on capital employed can be measured at each centre. This implies that if a centre does not make an adequate return (compared with other centres), in the long run it might be closed down. An exception would be a centre providing a product or service which is essential to the rest of the company, and which could not be bought outside more cheaply.

Opinions differ on whether all assets should be apportioned to profit centres, or only assets directly attributable to profit centres. For control purposes it is probably better to compare the "controllable profit" of each profit centre (revenue minus controllable costs), with the assets under the direct control of each centre, valued in current rupees.

The disadvantages of profit centres are :-

- (i) the time spent in negotiating internal transfer prices;
- (ii) any additional clerical cost of recording and charging internal transfers;
- (iii) at the end of the year, stock may include unrealised profit from one or more profit centres. For the external accounts, these profits must be eliminated.

Appendix 1

VARIANCE ANALYSIS

A. COST VARIANCES

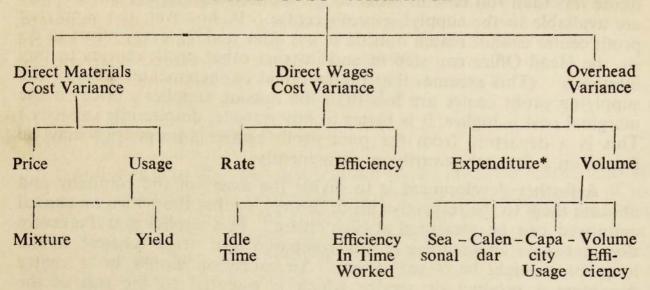
Total Cost Variance

"The difference between the total standard cost of the output achieved in a period and the total actual cost incurred" (Institute of Cost and Works Accountants). Note that all cost variances are based on actual output, not standard or budgeted output.

In this appendix, the ICWA definitions have been closely followed. For formulae, a sign convention has been added: since we think of variances as mainly adverse, a positive answer indicates an adverse variance, and vice versa, i.e. actual cost minus budget cost is adverse if the answer is plus.

Total cost variance may be analysed as follows:

TOTAL COST VARIANCE



*The ICWA Terminology breaks this down into price, efficiency and utilisation; this is seldom done in practice.

1. Materials Variances:

Direct materials = actual cost of — standard cost of materials for output achieved

Price variance = (actual price-standard price) x actual quantity (of materials)

N.B. Price variance may be separated at the purchase stage. Issues from stores to production would then be at standard price and the "actual cost of materials" (i.e. to production) excludes the price variance.

Usage variance = {actual - standard} x standard quantity quantity} x price

If 2 or more materials are *physically* mixed, and the proportion of any material *varies* from the standard mixture, then the total quantity of mixture will cost more if proportionately more of the higher cost material is used, and vice versa. This variance is called mixture variance and is broken out of the usage variance leaving what is called yield variance.

Mixture variance = {actual quantity in actual mixture} standard - actual quantity in standard mix} x price

(This is calculated for each material in turn, then added)

Yield variance = {actual quantity in standard mix } x standard - standard quantity in standard mix } x price

(This is calculated for each material in turn, then added.)

Example:

A material is made by blending 4 parts of X of which standard cost is Rs. 48/ton with 1 part of Y of which standard cost is Rs. 480/ton. Standard material loss in process is 10%. In a certain month, 345 tons of X were used @ Rs. 50/- per ton, and 95 tons of Y @ Rs. 475/ton. Output was 405 tons. Calculate materials cost variance and price, usage, mixture and yield variances.

Solution:

The first step is to find the standard quantities required for the actual output, and their cost. Since standard material loss is 10% the standard input for an output of 405 tons is 450 tons as follows:

The second step is to calculate the actual costs:

345 tons of X @ 50 95 tons of X @ 475	=	17,250 45,125
440		62,375

The overall materials cost variance can immediately be read off: (62,375 - 60,480) = 1895 adverse

The price variance is then calculated:

$$X (50-48) \times 345$$
 = 690 adv.
 $Y (475-480) \times 95$ = 475 fav.
 215 adverse

The usage variance may also be calculated:

Check: 215 + 1680 = 1895

The usage variance cannot be analysed between mix and yield until a further intermediate table is made showing the standard mix for the actual input quantity, viz.

N.B. It is not necessary to multiply by the prices.

Then mix variance is calculated from the difference between actual mix (actual quantity) and standard mix (actual quantity):

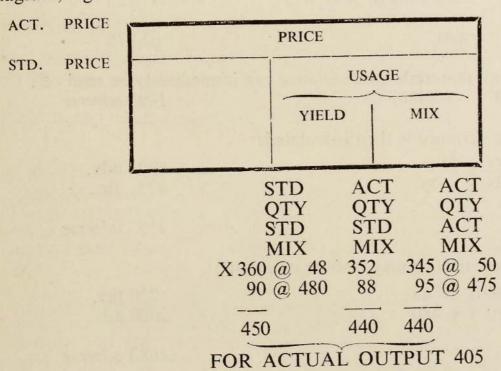
$$X (345-352) \times 48 = 336 \text{ fav.}$$

 $Y (95-88) \times 480 = 3360 \text{ adv.}$
 $= 3024 \text{ adverse}$

Yield variance is calculated from the difference between actual quantity (standard mix) and standard quantity (standard mix).

$$X (352-360) \times 48$$
 = 384 fav.
 $Y (88-90) \times 480$ = 960 fav.
 $= \frac{1344 \text{ favourable}}{1680}$

Many students can visualise this analysis more easily from a diagram, e.g.



2. Wages Variances:

If one is given the hours of idle time (hours paid for but not worked, due to lack of orders, lack of materials or supervision, machine breakdown, or operator absence), it is possible to break this out of the overall efficiency variance, leaving what might be called "efficiency in time worked".

Idle time variance = hours of idle time x standard rate

"Efficiency in time worked" variance = {actual hours worked - std. hours for output achieved} x std. rate

Example:

100 employees work a standard 40 hour week. The standard rate of pay is Re. 1/- per hour, and the standard output is 250 units/hour. During a certain week, 3,900 hours were worked for an output of 980,000. All employees were paid at Re. 1/- per hour except 5 @ Rs. 1/05 and 5 @ Rs. 1/10.

Calculate the direct wages variance and wage rate, efficiency, idle time, and "efficiency in hours worked" variances.

Solution:

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The standard hours of labour for the actual output (= output in std. hours) = $3920 (980,000 \div 250)$

Standard cost is 3920 @ Re. 1/- Rs. 3,920/-.

 $\frac{3 \times 40 \times 10^{-100}}{4,000 \times ave.} = \frac{1/10}{1/0075} = \frac{220}{4,030}$

The overall direct wages variance

= 4030 - 3920 = 110 adverse

The rate variance = $(1.0075-1.00) \times 4000 = 30$ adverse Efficiency variance = $(4000-3920) \times 1/- = 80$ adverse

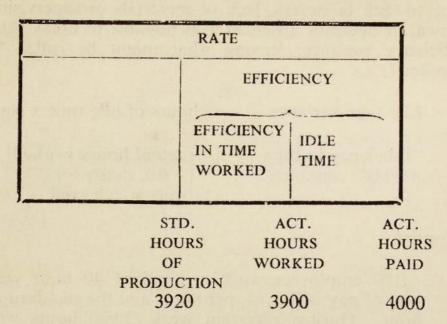
Check: 30 + 80 = 110

Idle time variance = $(4000-3900) \times 1/-$ = 100 adverse Efficiency in time worked = $(3900-3920) \times 1/-$ = 20 favourable

Check: 100 - 20 = 80

This may be represented diagrammatically as for materials variances:

1/0075 STD. RATE 1/00



It is also possible to separate out a labour mix variance when different grades of direct labour are employed. This is exactly analogous to a materials mix variance.

3. Overhead Variances:

Total overhead variance = actual — overhead absorbed in overhead output achieved

i.e. over or under-absorption. This is the same whether fixed budgets or flexible budgets are used, since the overhead absorption rate is the same in either case.

Expenditure variance = actual overhead - overhead budgeted for period

Volume variance = overhead overhead overhead overhead overhead overhead in output achieved for period

(The application of these formulae differs when the budget is flexed, see para 6).

In a standard costing system overhead is usually absorbed, not by a labour hour rate or a machine hour rate, but on an *output* basis (units or, more commonly, standard hours of output).

Volume variance is commonly analysed into capacity usage variance and volume efficiency variance; seasonal and/or calendar variances sometimes also apply.

(a) Overhead absorbed on standard hours of output:

Capacity usage variance	hours in budget period – actual hours	x standard rate of absorption
Volume efficiency variance	= actual hours- standard hours of output	x standard rate of absorption

(b) Overhead absorbed on units of output:

Capacity usage variance	= budgeted output- actual hours at the standard rate of output	x standard rate of absorption
Volume efficiency variance	= {actual hours at the standard rate of output - actual output	x standard rate of absorp- tion

(If overhead is absorbed on labour hours or machine hours *input*, the volume variance is all capacity usage variance, and there is no volume efficiency variance.)

Capacity usage variance reflects the under-absorption of overhead due to idle time omitted from the budget on which the absorption rate was based, offset by any hours of overtime or extra shift. It is a companion variance to labour idle time variance.

Volume efficiency variance, so-called to distinguish it from its companion labour efficiency variance, reflects the over - or under-absorption of overhead due to the rate of output being over or under standard.

Example:

	Year	Month
	Rs.	Rs.
Budgeted overhead	12,000	1,000
Budgeted output (std. hours)	24,000	2,000
:. O/H absorption rate	0/50 per std. hour	
Actual overhead	The same of the sa	1,250
,, hours		1,900
,, output (std. hours) , O/H absorbed		2,050
,, O/H absorbed		1,025

Solution:

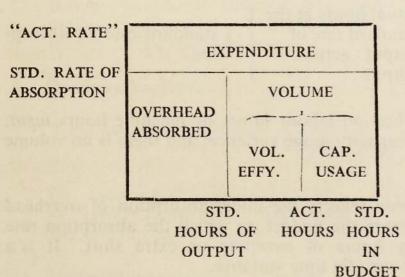
Total overhead variance = 1250-1025 = 225 adverse Expenditure variance = 1250-1000 = 250 adverse Volume variance = 1000-1025 = 25 fav.

Check: 250-25 = 225

Capacity usage variance = $(2000-1900) \times 0/50 = 50 \text{ adv}$. Volume efficiency variance = $(1900-2050) \times 0/50 = 75 \text{ fav}$.

Check: 75 - 50 = 25

This may be represented by a diagram in similar format to (but not identical with) materials and labour:



"Actual Rate" here means:

actual overheads std. hours in budget

It is not necessary to calculate, since expenditure variance is more easily calculated as (actual overheads – budgeted overheads) i.e. whole rectangle minus lower rectangle.

4. Calendar Variance:

Volume variance can arise also from the fact that the month (or whatever the reporting period is) has more or less working days or output than the budget month, causing more or less overhead absorption.

Suppose a firm does not work pre-Poya and Poya days, nor public, bank, and mercantile holidays. In a particular year the firm has 254 working days, an average of $21\frac{2}{12}$ a month, but 1 month had only 19 working days (January), and several had 22. A well-designed budgeting and accounting system would provide $\frac{19}{254}$ of the annual overheads for

January, not $\frac{1}{12}$ th, and also apportion actual overheads on a working day basis. (This assumes that overheads vary with working days, which is usually approximately true).

However, this is often not done, so a calendar variance arises.

In the above example, the overhead budget for January was 1/12th of the annual budget, i.e. it assumed 21 2 working days each month.

Therefore, calendar variance =
$$(21\frac{2}{12} - 19) \times \frac{24,000}{254} \times 0/50$$

= Rs. 102 adverse

This affects the capacity usage variance.

If overhead is absorbed on *units* of output, in the two formulae above, in place of standard rate of absorption per hour, substitute standard rate of output per hour x std. rate of absorption per unit.

Thus,

Capacity usage
$$=$$
 $\left(\begin{array}{c} 19 \times \frac{24000}{254} \\ \end{array}\right) - 1900 \times 0$ $0/50$ $=$ Rs. 52 favourable

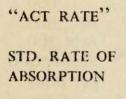
Check:
$$102 - 52 = 50$$

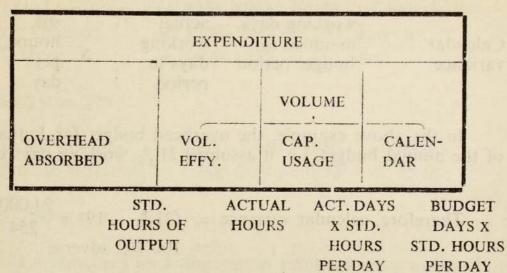
Note that this correction reveals that capacity usage was above standard not below.

Volume efficiency variance is not affected.

Over the full year calendar variances should cancel out (otherwise the arithmetic is wrong!)

The diagram may now be modified as follows:





5. Seasonal Variance:

Seasonal variations in output have the same effect. If more or less is produced in a month than budgeted simply because the budget is 1/12 of the annual figure with no adjustment for known monthly variations, then the overhead absorbed will be correspondingly more or less, and capacity usage variance will appear respectively low or high, unless a seasonal variance is extracted first.

If overhead is absorbed on units of output

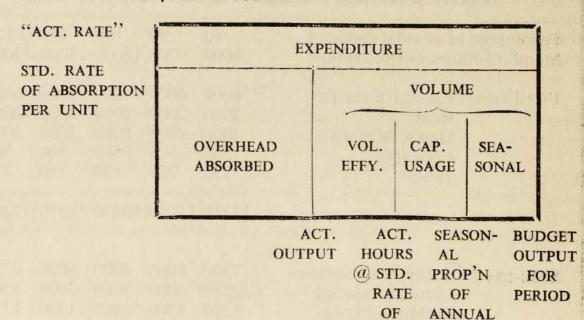
Example:

A canning factory finds that in past years its output in the month of April has been 15% of the entire annual output. Nevertheless, for convenience it budgets 1/12th of overhead each month.

	Year	Month
	Rs.	Rs.
Budgeted overhead	12,000	1,000
,, hours	24,000	2,000
,, output (cases)	18,000	1,500
\therefore Std. rate of output = 0.75 case per hour a	nd	
O/H absorption rate $= 0/67$ per case		
Actual overhead		1,500
,, hours		3,500
,, output (cases)		2,640
: ,, O/H absorbed		1,760

Solution:

Total O/H variance = 1500-1760 = 260 fav. Expenditure variance = 1500-1000 = 500 adv. Volume variance = $(2640-1500) \times 0/67$ = 760 fav. Check: 760-500 = 260Seasonal variance = $1000-(15\% \times 12000)$ = 800 fav. Capacity usage var. = $(15\% \times 12000)-(3500 \times 0.75 \times 0.67)=50 \text{ adv}$. Volume efficiency var. = $[(3500 \times 0.75)-2640] \times 0.67 = 10 \text{ fav}$. Check: 800-50+10=760



As before, volume efficiency variance is not affected. Seasonal variances cancel out by the end of the year.

OUTPUT OUTPUT

6. Flexible Budgets:

"A flexible budget is a budget which, by recognising the difference between fixed, semi-fixed and variable costs, is designed to change in relation to the level of activity attained". (I.C.W.A.)

A flexible budget is really a set of budgets for different levels of activity, e.g. for 80%, 90%, 100%, 110% and 120% of normal capacity. At the end of each month, the actual level of activity determines which budget is to be used for comparison with actual. The "level of activity"

usually means the standard hours of output achieved. However, in systems in which overhead is absorbed not on standard hours of output but on a machine hour rate or labour hour rate (i.e. on an input basis), the level of activity will more often be measured in terms of actual machine hours or labour hours worked.

A flexible budget does not affect the standard rate of absorption. This is predetermined at the beginning of the year and is based on the normal or expected activity for the year, as with a fixed budget. It will be apparent, then, that the *overall* overhead variance (actual overhead minus overhead absorbed) is the same for a flexed budget as for a fixed budget.

The difference arises on the analysis of this variance between overhead expenditure variance and volume variance. In a flexed budget expenditure variance is actual overhead minus flexed overhead allowed, and volume variance is flexed overhead allowed minus overhead absorbed. The following example shows how the analysis is carried out, contrasting a fixed budget with a flexed budget.

Monthly production overhead - flexible budget							
Percentage of Standard ho	Percentage of normal capacity Standard hours of production			100 10000		120 12000	
Fixed costs:	Executive salaries Rent Dep'n of machinery Insurance Taxes	6000 2000 3000 500 750	2000 3000 500	2000 3000 500	3000 500	6000 2000 3000 500 750	
		12250	12250	12250	12250	12250	
Semi-fixed:	Supervisory salaries Clerical salaries Building services	7500 2850 1200			8000 3000 1300	8750 3500 1350	
Arguel tre		11550	12300	12300	12300	13600	
	Indirect labour Factory supplies Maintenance & repairs Spoiled work Power	7000 2700 2400 800 900		3000	3150	9000 3150 2800 1050 1350	
		13800	15050	15450	17250	17350	
Total overhe	ads per month: Rs.	37600	39600	40000	41800	43200	

From the above table, the standard rate of absorption would be Rs. 4/- per standard hour of production, throughout the year.

In January, actual production = 8800 std. hours

actual hours worked = 8900

actual overhead = Rs. 39,900

Calculate variances (a) assuming a fixed budget (b) assuming a flexed budget.

	(a) Fixed budget	(b) Flexed budget
Overhead variance	= actual overhead – overhead absorbed = 39900 – (8800 x 4) = 4700 adv.	as opposite
Overhead expenditure variance	actual overhead –overhead budgetedfor period39900 – 40,000	= actual - flexed overhead allowed = 39,900 - 39,200 (interpolate in table for 8800 std. hours of output)*
Volume variance Capacity	= 100 fav. = overhead - overhead budgeted absorbed for period = 40,000 - 35,200 = 4,800 adv. (hours in budget) x std.	= 700 adv. = flexed - overhead overhead - absorbed allowed = 39,200 - 35,200 = 4,000 adv. flexed act. hours x
usage variance	= period-actual rate of absorp tion	= overhead - std. rate of allowed absorption
Volume	= $(10,000 - 8900) \times 4$ = 4400 adv. (actual hours) x std.	= 39,200 - (8900 x 4) = 3600 adv.
efficiency variance	= \begin{aligned} \text{worked-standard rate of hours of output absorp tion} \] = (8900–8800) x 4 \] = 400 adv.	

* For 8000 standard hours, overhead should be Rs. 37,600, and for 9000 hours it should be Rs. 39,600. Therefore, for 8800 standard hours, overhead should be $[37,600 + \frac{800}{1000}(39,600 - 37,600)] = 39,200$.

The advantage of flexing is to make the expenditure variance meaningful. Since some overheads are variable, the true comparison is with 39,200, not 40,000. So far from expenditure being 100 better than expected, it is 700 worse, since it should have been only 39,200 on the low level of activity.

Note that flexing does *not* eliminate the volume variance, since this still exists for fixed overheads.

Notes for advanced students:

- 1. There is a good deal of controversy over the way in which to flex a budget. It may be flexed on actual hours worked (labour hours or machine hours) instead of on standard hours of output. The logical basis is to flex costs on hours worked when they may be expected to vary with hours worked (e.g. labour benefits, power, machine repairs) and on standard hours of output when they may be expected to vary with output (e.g. operating supplies). However, this complicates the issue, and may be administratively difficult. In a standard costing system, overhead is normally absorbed on the basis of output measured in standard hours, irrespective of the method by which the budget is flexed.
- 2. Variances on a flexed budget can be divided between fixed and variable elements if we ignore the existence of stepped costs (such as salaries) and variable costs that are not proportionately variable (such as fuel for heat processes).

If a budget is flexed on actual hours worked, the overhead expenditure variance consists of (i) actual fixed overhead minus budgeted fixed overhead plus (ii) actual variable overhead minus (budgeted variable overhead per hour multiplied by actual hours worked)

The capacity usage variance represents part of the over – or under – absorption of fixed overhead only:

{budget hours for month minus actual hours worked } x budgeted fixed overhead per hour

The volume efficiency variance consists of

(i) (actual hours worked minus standard hours of x budgeted fixed overhead per hour output)

(This is sometimes called "effectiveness variance")

plus (ii) (actual hours worked minus x budgeted variable overhead standard hours of output) per hour

If a budget is flexed alternatively on standard hours of output, the overhead expenditure variance consists of:

- (i) actual fixed overhead minus budgeted fixed overhead
- plus (ii) actual variable overhead minus (budgeted variable overhead per hour multiplied by standard hours of output).

The capacity usage variance represents part of the over – or under– absorption of fixed overhead as above.

The volume efficiency variance represents the balance of over - or under-absorbed fixed overhead due to standard hours of output being more or less than actual hours worked.

- The ICWA Terminology of Cost Accountancy does not clearly define volume variance (5.443.1) and overhead expenditure variance (5.443.2). In this text "standard allowance for the output achieved" is described as "overhead budgeted for the period". The latter is of course The basis of flexing may be on hours worked or on standard better flexed. hours of output. If the "overhead budgeted for the period" is flexed on standard hours of output, the volume variance represents the over- or under-absorption of fixed costs alone, as stated in the Terminology.
- The Terminology divides overhead expenditure variance into overhead price, overhead efficiency and overhead utilisation variances. The definition in the Terminology may be amplified as follows:

Overhead price variance (for each overhead item both fixed and variable)

actual cost minus (actual quan-= tity of item multiplied by its standard price)

Overhead efficiency variance (for hours worked)

(actual hours worked minus staneach overhead item variable with = dard hours of output) multiplied by the standard cost of the item per standard hour of output

Overhead utilisation variance (for each overhead item variable with = hours worked)

(actual quantity of item minus the standard quantity for the hourworked) multiplied by its standard price

Overhead utilisation variance (for each overhead item variable with = output)

(actual quantity of item minus the standard quantity for the standard hours of output achieved) multiplied by its standard price

Example:

A standard hour of output requires 3 KWH of power @ 0/20 per KWH. Output for the month is 6000 standard hours. Budgeted allowance

(flexed on output) $= 6000 \times 3 \times 0/20 = \text{Rs. } 3600.$ Actual hours = 5700 $= 5700 \times 3.2 \times 0/25 = \text{Rs.} 4560$ Actual cost Overhead expenditure variance = 4560-3600= 960 adv.Overhead price $= 4560 - (5700 \times 3.2 \times 0/20)$ variance = 4560 - 3648= 912 adv.Overhead efficiency $= (5700-6000) \times 3 \times 0/20$ variance $= -300 \times 0/60$ = 180 fay.

Overhead utilisation =
$$[(5700 \times 3.2) - (5700 \times 3)] 0/20$$

variance = $1140 \times 0/20$ = 228 adv.

Check: 912-180 + 228 = 960

NB. Not all writers follow the above definitions. Some limit volume efficiency variance and overhead price variance to the fixed costs. The volume efficiency variance on costs which are variable with time worked is identified as the overhead efficiency variance, while the balance of variance on variable costs is the overhead utilisation variance.

7. Methods Variance:

"The difference between the standard cost of a product or operation produced or performed by the normal method, and the standard cost of the product or operation produced or performed by the alternative method actually employed". (I.C.W.A.)

A methods variance can arise under materials, wages or overhead and should normally be isolated before other variances are calculated.

Example:

The standard cost of a machine operation is Rs. 100. The standard cost of performing the same operation by hand is Rs. 130. If the machine breaks down and the operation has to be done by hand, a methods variance of Rs. 30 adverse arises.

8. Revision Variance:

"The variance between the basic standard cost and the revised standard cost" (I.C.W.A.)

This arises when a budget or standard is revised but, as a matter of policy or administrative convenience, the basic standard cost continues to be charged to jobs.

A revision variance, like a methods variance can arise on any cost element, and should normally be isolated before other variances are calculated.

Example:

The standard rate for wages is Re. 1/- per hour. During the year, a 10% cost-of-living allowance was introduced and the wages budget was revised, but the standard rate was not increased until the end of the year. A revision allowance of -/10 adverse per hour paid will be extracted before other labour variances.

B. SALES AND PROFIT VARIANCES

9. Sales Variances:

Actual sales may vary from budget sales on price (basic price, discounts, allowances) and on volume (quantity, mix of products). The

calculation of these variances follows closely the calculation of materials variances.

Note: These formulae maintain the convention that a + variance is adverse. They are often expressed as actual minus standard, in which case a + variance is favourable.

Example:

A firm makes a product in 2 models, X and Y. Standard sales are as follows:—

Calculate sales variances.

Solution:

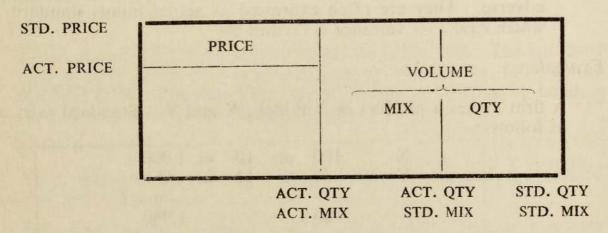
Total sales variance is:
$$1960-1836$$
 = 124 adv. Sales price variance is: $X (10-10\frac{1}{2}) \times 90 = -45$ $Y (12-11) \times 81 = 81$ = 36 adv. Sales volume variance is: $X (100-90) \times 10 = 100$ $Y (80-81) \times 12 = -12 = 88$ adv.

Check: 88 + 36 = 124

Quantity variance and sales mix variance can only be separated after making a further intermediate table showing the standard mix for the total quantity sold:

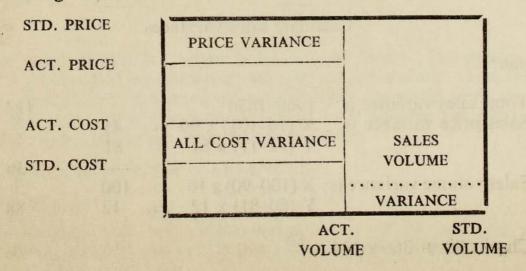
This analysis may be represented diagrammatically:

Check: 98 - 10 = 88



10. Profit Variances:

It is not possible to add sales revenue variances and cost variances, as defined above, to get the variance of actual profit from standard profit, because the sales volume variance includes the standard cost of these sales (see diagram).



However, if sales *margin* variances are substituted for sales *revenue* variances, we can get the profit variance by adding sales margin variances, materials, labour and overhead cost variances, plus variances on items which do not enter into the standard cost of production, such as stock increase or decrease, administrative expenses, selling and distribution expenses, financial charges, etc.

Total sales margin variance = standard margin on budgeted - actual selling price minus standard cost x actual sales

Note that this is *not* the difference between standard margin and actual margin since this would include the cost variances.

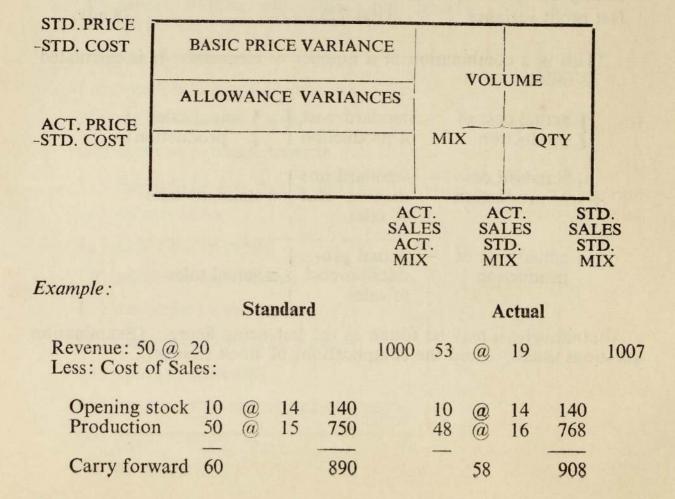
Sales margin variance due to selling price = { standard - actual price } x actual quantity sold

This may be sub-divided between basic price and allowances.

Sales margin variance due to sales volume = $\begin{cases} standard - actual \\ sales \end{cases} x \begin{cases} standard margin \\ per unit \end{cases}$

This may be sub-divided between mix and quantity.

Cost variances due to variation from standard mix should be set against sales margin variance due to sales mix.



Brought forward	1 60	890		58			908	
Less: Closing stock	10 @ 15 	150	740	5 53	@	16	80	828
Gross Profit			260					179
Less: Admin. experience Selling & dist'			50 110					43 114
Net Profit			100					22

Explain the difference in net profit.

Solution:

*This is a combination of a number of elements. It is calculated as follows:-

Alternatively, it may be found as the balancing figure. (Examination questions usually avoid the complications of stock changes).

INTERNAL CONTROL QUESTIONNAIRES

These questionnaires are illustrative only. Each department needs a questionnaire tailor-made for its functions, organisation and staffing.

Most of the questions are worded so that a "No" answer indicates a control weakness.

Section A - General

These questions should reveal whether the breakdown and delegation of responsibilities has been carefully thought out, or whether the organisation is merely the result of haphazard and unplanned growth. All control is control of persons; it is therefore necessary to assign defined responsibilities to named individuals.

	Questions	Answers	Action
1.	Is there an up-to-date organisation chart?	grandura sea	
2.	Are responsibilities of officers clearly defined?	edges the	
3.	Are there Accounting Manuals specifying procedures for financial accounting and stores accounting?		
4.	Are there written authorities and limits for officers to:		115 %
	(a) sign cheques		50d
	(b) approve bills and claims		
	(c) certify bills and claims	BIDSIS LO	THE THE
	(d) approve purchase indents		
	(e) sign purchase & works orders		
	(f) open tenders		
	(g) hold cash imprests		
	(h) authorise expenditure		
	(i) authorise stores issues		
	(j) undertake Boards of Survey		
	(k) approve write-offs		
	(1) approve revenue rebates or credits		
	(m) approve overtime		
	(n) hold safe keys		

1 2

- 5. Is the accounting function completely separate from:
 - (a) selling?
 - (b) purchasing?
 - (c) manufacturing?
 - (d) credit granting?
 - (e) cash receipts?
 - (f) cash payments?

(Accounting must be separated from custody of assets in order to keep a check on the custodians).

- 6. Are accounting employees' duties rotated?
- 7. Are all employees required to take their due leave?

(Many frauds have been discovered only when the defaulter has been sick or gone on leave).

8. Are employees in positions of trust fidelity bonded?

(Fidelity bonding is a form of employee insurance common in U.S. An alternative is careful selection of employees and use of direct reference).

- 9. Is collusion improbable between employees who are relatives?
- 10. Are costs and expenses under budgetary control?
- 11. Is adequate control exercised over decentralised operations (cashiers, stores, etc.)?
- 12. Are all essential records secure from fire, theft, etc.?

(Security of records should be reviewed at least yearly. Records should be categorised as essential, useful, and dispensable. Essential records should be kept in fire-proof cabinets, or duplicated and stored in different locations).

Action

Answers

Section B - Cash and Cheques received

Control over cash is most important because cash is the most convenient asset to the defaulter, but it is also the easiest to control (c.f. stores).

1.	Is correspondence containing cash, cheques, etc. opened on receipt by a responsible official other than the cashier or a person having access to the revenue ledger?
2.	Does he immediately list all remittances, and are such lists compared daily with the cash book?
	(Cash control should be established as soon as possible. Mail should be opened on receipt, since there is a risk of interception and misappropriation.
	If possible this should be done by someone other than the cashier, to provide an additional control on receipts).
3.	Are cheques immediately crossed to the appointed bank?
	(A cheque crossed to the appropriate bank account is of no value to any other account).
4.	Are all receipts kept intact and banked daily?
	(Handling of cash receipts must be highly restricted, otherwise responsibility for differences cannot be definitely assigned. Where more than one person handles receipts, it is common practice to require them to keep separate books and account separately.

Questions

5. Is the cashier (or anyone else handling cash) prevented from making entries in the records to which the cash applies (revenue ledger, customers ledger, general ledger)?

No cash payments should be made from

Cash receipts should be banked daily to prevent borrowing ("teeming and lading").)

receipts; this reduces control.

Questions

Answers

Action

(Control over the cashier is not by reference to his Cash Book, but by reference to the records which state the amounts receivable. If a cashier or salesman pockets cash, he will be caught when the customer objects that he is no longer a debtor, unless he can suppress the accounts copy of the invoice or arrange a fictitious credit to the customer's account (e.g. for discount or other allowance).)

6. Are serially numbered and printed counterfoil receipts made out for all receipts?

(Similarly the agreement of counterfoil receipts with the Cash Book does not prove that all revenue has been fully accounted for, since counterfoils are easily manipulated (except in special writing equipment, see below). However, the issue of receipts reinforces the control by reference to the record of amounts receivable; the customer can prove he has paid, and the cashier is accountable for that sum).

- 7. Is a cash register or autographic register used to record all cash sales?
- 8. Are counterfoils, till rolls, etc. independently compared daily with total cash taken?

(A cash register which incorporates sealed till rolls or a writing device with sealed carbon copy provides a record of all amounts for which receipts are given. It does not ensure that all cash is accounted for, since many customers do not look at their receipts.

Control of cash sales is difficult unless stock is also controlled).

9. Is scrap controlled in such a way that all sales are brought to account?

(Sale of scrap, or assets fully written off in the books, is often vulnerable to fraud. Quantities of scrap etc. should be recorded at the point of origin, and all sales and closing stocks reconciled back to these quantities).

10. Are bad debts controlled in such a way that any amounts subsequently collected are brought to account?

mbl	Questions		Answers	Action
	(Bad debts should not be written of they are proved irrecoverable; they separated to a special account, but i is written off there is little or no cont any eventual recovery).	may be f a debt		
11.	Are dividend and interest receipts with what is receivable per invaccounts?			
12.	Are rents, wayleaves, etc. received with what is receivable per rent roll, accounts and past collections?			
13.	Are receipts from insurance claims, suretc. independently controlled?	rcharges,		
	(These and any other "irregular" should be subject to control).	receipts		
14.	Do branch cashiers account to headaily for cash received and banked?	ad office		
	(Delayed deposits is a common detached branches).	fraud in		
15.	Is authority to receive cash strictly lin	mited?		
	(If salesmen are allowed to make confor customers control is very difficult opportunities for withholding or cash are multiplied).	and the		

Section C - Cheque payments

Cash payments are made for assets and for expenses. Payments for assets should of course set up assets which can be verified, but control of expense payments is more difficult in that the benefits are often consumed and there is nothing to prove the validity of the payment. Control rests on the validity of the voucher from an outside source, and on the certification by an authorised person that the benefit has been received.

	Question	Answers	Action
1.	Are all payments, other than petty cash and wages, made by cheque?		
	(Payments should as far as possible be made by cheque (i) to reduce the amount of cash on the premises, and (ii) to allow control to be concentrated on the cheque preparation procedure).		

- 2. Who has authority to sign cheques, and countersign, and up to what limits?
 - (The bank should be notified in advance of changes in the list of authorised signatories by reason of transfer or retirement).
- 3. Are cheque books kept in safe custody, and spoiled cheques clearly cancelled, to prevent forgery?

(Banks usually require that blank cheque forms be kept in safe custody, since they are liable for any payment on a forged signature).

- 4. If cheque signing machines are used, are these in safe custody?
 - (Safe custody and regulations for the use of cheque signing machines are obviously of the first importance).
- 5. When cheques are presented for signature, are approved invoices and other vouchers also presented?

(Cheques should not be presented for signature until vouchers have been passed for payment, but the signatory will also perform a spot audit by reference to the supporting documents).

6. Are invoices and other vouchers perforated or stamped 'PAID' at the time the cheque is signed?

(Double payment is very easy, especially regular payments such as hire purchase or contract instalments, unless (i) payment is only made on full documentation and (ii) documents are clearly cancelled at the time of payment).

7. Are bank statements reconciled to the cash book at least monthly by a person other than the cashier?

(The proof of the cash book is by reconciliation with the bank statement. Many frauds have been concealed where the cashier has made the "reconciliation" and destroyed misapplied cheques on their return).

- 8. Are cheques restrictively crossed and despatched promptly after signing?
- 9. Are all discounts taken?
- 10. Are cash and securities kept in secure safes, vaults, etc. with access restricted to designated custodians, and locked when not attended?

(Each safe should be the responsibility of one person; if use of the safe is shared, the custodian takes cash on charge from the sharer, and must account for the total.)

11. Are branch payments made from a separate bank account kept on an imprest basis.

(The imprest system may be used for separate bank accounts as for separate cash balances).

Section D - Petty cash

- 1. Is the imprest system used?
- 2. Is the imprest amount reasonable in relation to the level of expenditure and frequency of reimbursement?

(The amount of the imprest can be reduced below the maximum expected expenditure in a period if reimbursements can be quickly obtained in an emergency.

Imprests should be kept at a minimum since they have an interest cost, and an insurance cost).

3. Are petty cash vouchers received for all payments, and produced at each reimbursement?

(No reimbursement should be made except on the production of authorised vouchers, which should then be cancelled).

- 4. Are petty cash vouchers prenumbered and made out in ink?
- 5. Is authority for signing or approving vouchers clearly laid down?
- 6. Are cheques approved before cash is given on them?

(Often employees are given the facility of cashing cheques with the petty cashier. Regulations should be made as to limit of amount and credit approval before cashing).

- 7. Are cheques, etc. promptly banked?

 (The same security should apply to cheques, I.O.U. s, etc. as to cash).
- 8. Are advances from petty cash officially approved?
- 9. Is there a limit to the amount that can be paid out on any voucher, or on classes of voucher?
- 10. Is there columnar analysis of expenditure, and monthly reconciliation with the total column?

(Columnar analysis is more efficient than an end-of-period abstract, and aids the checking of arithmetic. It also provides a comparison with previous periods).

- 11. Does expenditure appear reasonable?
- 12. Does only the petty cashier have access to cash box and vouchers?
- 13. Are surprise checks made on the cash balance?

(Surprise checks should be made simultaneously on all cash balances at one location to prevent transfers between different funds to cover losses).

14. Is cash insured?

Section E - Wages and Salaries

Wages and salaries are a major element of expense in every organisation, and often the largest single item.

Primary control begins with authorisation of establishment and rates of pay. Beyond this is the more difficult problem of relating pay to output, especially where output is difficult to measure, as in many clerical and executive operations. The main attack on this problem is made by work study and analysis, which asks what is done and why is it done?

Fraud is more common in payrolls than anywhere else. The addition of "dummy" names or the manipulation of hours worked (or production in the case of incentive pay) results in a cash payment which needs no further covering up since it is immediately charged off as operating expense. Budgets and standards are usually too broad to throw out a fraud as an adverse variance unless it is a fraud for a very large sum.

Q	ue	est	ioi	ns	

Answers

Action

1. Is employment properly authorised?

(Particular attention should be given to temporary and casual labour, and to transfers from other departments).

2. Are transfers and retirements immediately reported to the Payroll Department?

(Fraud has often occurred by leaving on the payroll personnel who have left, e.g. by altering the date of termination to a later date).

- 3. Are pay increases and decreases properly authorised and immediately reported to the Payroll Department?.
- 4. Are clock cards maintained for all employees, showing starting and finishing times and overtime?

(Where employees are paid on a time basis, each employee's starting and finishing times must be recorded. Special provision must be made for recording overtime, for piecework operators put on time rate jobs, and for employees who receive different rates on different jobs, e.g. where time spent on maintenance is paid at a lower rate than time spent on construction).

- 5. Is overtime properly authorised?
 (Overtime should be authorised in advance by the manager responsible).
- 6. Are clock cards controlled to prevent incorrect entries or alterations?
- 7. Are clock cards for employees on leave or sick or otherwise absent retained by the timekeeper?

(Where the number of employees is large, there must be positive identification, e.g. by a pass with photograph to prevent substitutions, e.g. a lower paid employee might use a higher paid employee's clock card).

8. Are piecework records compared with actual production?

(Precautions should be taken against double counting or (where the rate depends on output) holding back production from one period to the next).

9. Is the preparation of the payroll divided over the maximum number of employees?

(Responsibilities should be clearly laid down, e.g. entry of hours, entry of rates, extensions, additions, reconciliation, drawing cheque, cashing cheque in required denominations, making up packets, and each clerk should initial for his section of the work. The payroll, individual earnings record card, and payslip, should all be written in one operation by means of pegboard and carbon paper, or machine, to prevent errors of transcription).

- 10. Are employees rotated in their payroll duties?
- 11. Are payroll records regularly compared with the personnel department records?

(Personnel department records should be maintained independently of payroll preparation to provide an internal control).

- 12. Is the payroll total regularly reconciled with balances on the employee earnings records? (The payroll totals should agree with the total changes in the individual earnings records from one period to the next).
- 13. Is pay made by cheque or in currency?
- 14. If in currency, are receipts obtained from employees and are these independently compared with the payroll?
- 15. Is the pay distribution independently witnessed?

Action

(Payees should be identified, e.g. by their supervisors).

- 16. Is a pay packet given only to the payee or to a person authorised in writing by the payee?
- 17. Is the paymaster independent of the payroll preparation?

(The most important division of responsibility is between payroll preparation and pay disbursement).

- 18. Is the payroll paid through a separate bank account, and independently reconciled monthly with the account totals?
- 19. Is proper control exercised over unclaimed wages?

(Unclaimed wages should be held (not by the payroll department) in safe custody for a prescribed period and then banked).

- 20. Are all deductions from gross pay authorised either by law or by the employee in writing? (If employees do not understand how their pay is calculated (which is often the case in incentive payment systems) control over deductions is especially important).
- 21. If advances of pay are allowed who may authorise them and within what limits?
- 22. How are advances notified to Payroll Dept. and how are they recovered?
- 23. How is holiday pay dealt with?

Section F - Purchases and Creditors

1. Is all purchasing centralised in the Purchasing Department?

(To prevent unauthorised ordering (on which the organisation may be legally bound), authority to order should be strictly designated, and the Purchase Order should carry a notice to suppliers that only orders on the official order form will be honoured by the organisation).

2. Is the Purchasing Department independent of Receiving and Accounts?

Questions

Answers

Action

- 3. Are sealed tenders for major supplies invited by advertisement?
- 4. Are tenders opened and recorded only by authorised personnel?
- 5. Are records kept of competitors' tenders, bids and quotations and reasons where the lowest price is not accepted?

(Where there are alternative sources of supply the Buyer may be under considerable pressure to prefer one to another. The supplier may be 'friendly' to the extent of excessive entertainment or even bribery. Many firms prohibit acceptance of any gifts from suppliers. Competitive quotations should be obtained whenever suitable. In addition major contracts may be treated on an open tender basis).

6. Are all purchases (materials and services) made on the official Purchase Order?

(There may also be control over the raising and approving of Requisitions).

- 7. Are Purchase Orders properly approved for quantity price and supplier?
- 8. Does the Accounts Department receive directly a copy of the Purchase Order, and a copy of the Goods Received Note?

(The Goods Received Note is an independent check that value has been received before payment is made).

- 9. Does the Receiving Department receive a copy of the Purchase Order?
- 10. Are Goods Received Notes pre-numbered in sequence, and does the Accounting Department check the sequence?

(Pre-numbering deters the suppression of a document to conceal a misappropriation).

11. Is the Accounts Department immediately notified of returns to suppliers?

Answers Action

12. Are shortages and damaged goods properly reported?

(Any reason for non-payment of the invoice must be immediately notified to the person responsible for passing invoices for payment. Control procedures must also be set up for goods not accepted pending their disposition).

- 13. Does the Accounts Department match all invoices with Purchase Orders and Goods Received Notes?
- 14. Are all invoices checked for arithmetic and for transport and packing charges, discount, etc.
- 15. Are invoices for services, etc. properly approved by executives before payment?
- 16. Are all related documents for an invoice assembled prior to approval for payment?

(Responsibility for each step in the invoice payment procedure should be clearly laid down. Performance of each step or check may be initialled in a box stamped on the invoice or voucher).

17. Are capital purchases and continuing contracts (leases, hire purchase, etc.) appraised before commitment by legal technical and accounting functions?

(Large scale or long term commitments should be thoroughly planned and reviewed, using modern techniques of appraisal, before authorisation. Variations or additions must be similarly authorised).

- 18. Are special arrangements made for purchases on behalf of employees?
- 19. Are special arrangements made for purchases from other departments?
- 20. Are suppliers' statements independently checked against their accounts?
- 21. Is a Purchases Control account kept for the accounts in the Suppliers Ledger?
- 22. Is a postage meter used for out-going mail?

Questions

Answers

Action

Section G - Sales and Debtors

- Are all orders entered on an official Order Form?
 (A standardised order form is very desirable).
- 2. Are all goods sold at list prices?
- 3. If not are all discount and allowances properly approved (not by the salesman, or anyone having access to cash collections)?

(Pricing should be controlled to ensure that all costs are recovered or if they are not recovered that there is adequate reason. Particular attention should be paid to non-standard contracts).

- 4. Who is responsible for credit control, and how is credit checked before acceptance of order?
- 5. Who may authorise despatch of goods?

(Despatch of goods should not be authorised by stores or despatch. The release for the goods is the accepted sales order).

- 6. Is the authorisation and recording of despatch independent of accounting and invoicing?
- 7. Are despatch notes pre-numbered in sequence and are invoices issued for all despatch notes?

(Collusion between despatch and, say, invoicing could result in the suppression of an invoice, and the misappropriation of goods).

8. What arrangements are made for sales returns?

(Control must be set up on returned goods as early as possible, e.g. on notification of rejection, or on receipt at the gate. A Goods Received Note makes the storekeeper accountable).

9. Who may authorise credit notes?

(Credit notes should be pre-numbered in sequence, and authority to issue (against Goods Received Notes) defined).

- 10. Are invoice prices, quantities, extensions and totals checked before issue?
 - (Not necessary in a mechanised system of billing).
- 11. What control is there of goods despatched free of charge or on special terms?
- 12. Are goods despatched checked at gate with customers' orders, despatch notes, and invoices?

(A copy of the invoice is often used as a gate release).

- 13. Are debtors' statements prepared or checked by personnel who do not have access to cash receipts or credit notes?
- 14. Who deals with customers' queries on their statements?
- 15. Are balances confirmed by direct communication with customers?

(The purpose of these questions is to ensure that cash from debtors is not borrowed ("teeming and lading") or stolen without the necessity of putting a fictitious credit to the customer's account).

16. Who authorises the write-off of bad debts and how is such authority evidenced?

(Authority for write-off or any other non-cash credit to a customer's account must not be allowed to anyone in the cash receipts function).

17. Is a debtors' control account maintained and regularly agreed independently with the balances on the Sales Ledger?

(A control account enables a Balance Sheet to be drawn up quickly. Moreover, from an internal control point of view, it provides a total check on the arithmetical accuracy of all postings to the ledger, and additions and balances. If it is kept independently of the ledger it operates also to deter fraudulent entries (or to show them up as a difference for investigation).

_	Questions	Answers	Action
18.	Are accounts periodically aged (analysed by period of credit taken) and delinquent accounts followed up?		
	(Aging not only provides a basis of estimating bad debts; it may also reveal accounts on which fraud has occurred).		

Section H - Stocks and work in progress

Questions

Traditional procedures often place great emphasis on the control of cash, to the virtual exclusion of control of stores. This disregard for stores is often matched by a different moral attitude on the part of the employee; a stores assistant who would not dream of putting his hand in the till will often divert the firm's goods to his own use almost as a right.

Few businessmen appreciate how much money they are spending on stocks. These costs include not only pilferage but interest on capital tied up, rent of space, storage racks and bins, wages of stores and records personnel, deterioration, breakages, obsolescence and insurance. Various estimates indicate that these costs each year may exceed 25% of the value of average stocks carried, and highlight the opportunities of reducing costs by pruning stocks. With modern stock control methods continuity of supply can be maintained while stocks are significantly reduced.

	Questions	Answers	Action
1.	Are all stocks under the control of a store-keeper?		1000
	(Responsibility for all materials must be located and defined).		
2.	Is there a Stores Accounting Manual?		
3.	Are perpetual inventory records maintained for raw materials, work in process, finished goods, non-production materials?		
	(Stores accounting is as necessary as cash accounting. If records are not kept of the stores for which the storekeeper is accountable, losses must be expected).		
4.	Are all purchases delivered to Stores?	Sentage Sa	
	(If materials are in some cases delivered direct to site a Goods Received Note and Requisition should be passed through the central stock records for stock control purposes).	A SAN PERMIT	

5. Is there control at the point at which finished goods are completed?

(Completed production is the start of a pipeline which continues through stock and debtors to cash. Losses must be prevented before goods enter the pipeline, by counting or measuring production at the earliest possible stage).

- 6. Are deliveries from stores made on requisition only?
- 7. Who may authorise the requisition?

(The storekeeper is accountable for all stores received less what has been issued on authorised requisitions (and authorised write-offs).

8. Are stock records kept independently of the storekeeper's records (bin cards)?

(If independent stock records are not kept e.g. by production control or cost accounting, the storekeeper's records must be proved by reference to Goods Received Notes. Stores Requisitions, etc. from independent sources).

9. Are stock records kept on loose leaf or card ledgers?

(Bound stock ledgers are expensive and cumbersome and columnar analysis under more than about six headings is inefficient and error-prone. Loose leaf binders or trays of record cards are better for stock records from the point of view of cost, efficiency and internal control).

10. Are stock records verified by physical count at least twice a year, taking items in an unpredictable order?

(It is not necessary that the stores operation be disrupted by counting all items simultaneously; a few items may be checked at each visit).

11. Is special attention given to small and valuable stores which are easily stolen?

Questions

Answers

Action

(Attractive items should be counted more frequently).

- 12. Are differences between stock records and physical count properly investigated and accounted for? What is cut-off procedure?
 - (Stock losses for which there is no good reason should be charged to the storekeeper).
- 13. Are stock losses recorded and written off before investigation?

(There is no point in maintaining incorrect stock records pending investigation).

14. Is there a Materials Controller with responsibility for reducing stock levels while maintaining continuity of supply?

(Purchasing, production and sales functions usually press for higher and more varied stocks irrespective of cost. Someone should be made responsible for restraining stock levels and reducing costs by stock control).

- 15. Are maximum and minimum levels set for each stores item based on rates of usage and re-order times?
- 16. Are these reviewed whenever the stock level goes outside these limits, and also once a year?
- 17. Is the re-order level physically segregated so that re-order is automatic at the right time?
- 18. Are orders recorded to prevent double ordering?
- 19. Are obsolete and damaged goods reported and what action is taken?
- 20. Are rates of turnover regularly reviewed?

(The maximum level should not be much more than the order quantity. Stocks may be re-ordered regularly, or individual items may be re-ordered at the point at which there is sufficient to last the next consignment. (The latter is known as the "2-bin" system and is assumed in question 17).

The rate of turnover is a good control tool for comparing one year with another, and one activity with a similar activity elsewhere. A rate of turnover of 2 implies that stocks sufficient for 6 months are being carried. The more perishable the goods, the higher the turnover rate should be e.g. milk should have a turnover rate of 365, i.e. daily).

- 21. What action is taken to reduce excessive or slow-moving stocks?
- 22. Are the following properly accounted for:
 - (i) Scrap stocks and sales?
 - (ii) Excess materials returned to store?
 - (iii) Returnable containers?
 - (iv) Goods on consignment, and on sale or return?
 - (v) Goods in transit?
 - (vi) Stock on hand not the property of the Department?
 - (vii) Sub-stores? (Imprest System?)
 - (viii) Counter sales?

(The storekeeper must be made accountable for scrap, excess materials, and containers left in his charge, and having saleable value.

Sub-stores may be put on the imprest system and replenished periodically (or as required) from the main store. The main storekeeper should issue replenishments only to the extent that he receives authorised requisitions from the sub-store).

23. When consumable supplies are issued from stores, is there adequate control over quantities not immediately used?

(Control after issue is the responsibility of the user department).

24. Are Work in Progress accounts kept and charged with all materials issues, direct labour and overhead attributable to work being done?

Questions

Answers

Action

- 25. Is the stores well laid out so that each item is easily accessible and materials handling and losses reduced to a minimum?
- 26. Is storage space (area and height) adequate in relation to present and future needs?
- 27. Who has access to the store, and is the store secure against others?(There should be one entrance only, and one exit (separate from the entrance). Both
- 28. Are earliest materials received always issued first to reduce deterioration etc?

 (Materials should not be stacked in piles so that earlier materials are inaccessible).
- 29. Are fire precautions adequate?

should be manned or locked).

- 30. When was the last fire drill?
- 31. Are all stocks insured?
- 32. Are goods invoiced to branches at selling price?

(This makes Branch Manager accountable for the selling price. He must produce cash, closing stock, authorisations for write-offs, allowances, etc. to equal total invoiced value).

Section I - Fixed Assets and Investments

- 1. Who may authorise capital expenditure, and up to what limits?
- 2. Are commitments controlled against authorised costs?
- 3. Are significant variations between actual costs and authorised costs investigated? In construction projects, is progress controlled as well as cost?

(The authorisation and control of capital expenditure is important in proportion to the size of the expenditure and its long-lasting effect. Actual costs should always be compared against forecast costs (i) so that forecasters build experience and judgement, and (ii) lest the project require re-assessment and possible modification or discontinuance.

Action

Actual revenue or other benefits should, if possible, also be measured and compared with expected benefits)

- 4. Are all capital expenditures posted to an Assets Register with a loose leaf account showing all details of each separate asset?
- 5. Is each asset identified and numbered, e.g. by brass tag, engraving, or indelible ink and kept securely?

(If there is no Asset Register, the only protections against the disappearance of assets are (i) the possibility of constructing an Asset Register from past invoices and other records (this soon becomes impracticable), and (ii) the honesty of those who have physical custody of the assets. Reliance on honesty is not an internal control. Marking the organisation's assets is a partial protection, but marks may be removed or disguised, and in any case are only useful if the asset can be found).

- 6. Is a control account kept for the Assets Register, and periodically agreed independently to the total on the register?
 - (Plant, Equipment, Vehicles and similar ledger accounts may each be used as a control account for the appropriate section of the Assets Register).
- 7. Who may authorise the sale, scrapping, transfer or other disposition of fixed assets, and is there control over receipts from disposals?

(Authority to dispose of assets may be compared with authority to incur capital expenditure. If an asset has saleable value, control should be followed through to the receipt and accounting for cash).

- 8. Are assets immediately taken out of the Assets Register on disposal?
- Are assets periodically physically inspected to verify:
 - (i) their existence?
 - (ii) their condition?

- (iii) their location and use?
 (Boards of Survey or other inspectors should be independent of asset authorisation and accounting. The condition of assets is important for depreciation accounting and maintenance and replacement planning. Assets such as vehicles should be safeguarded against unauthorised use).
- 10. Are assets in use distinguished from assets not in use?

 (The value of assets not in use at any particular time is a measure of inefficiency in the utilisation of capital).
- 11. Is the Asset Register used:
 - (i) for depreciation calculations?
 - (ii) for recording maintenance and planning maintenance programs?
 - (iii) for planning capital replacements?

 (The Asset Register is not only an accountability record, but a planning tool of management).
- 12. Are all investment expenditures and proceeds posted, to an Investment Ledger, with a loose leaf account for each separate security showing the date of payment of interest, dividends, rent, etc.
- 13. Is the Investment Ledger periodically agreed independently with a control account?
- 14. Who has custody of documents of title, and are these periodically inspected?
- 15. Are bonuses, rights, capital repayments, and income properly accounted for?

(Investment ledger accounts commonly contain additional columns for income, so that it is easy to ensure that all income is duly received.

Precautions should be taken against unauthorised use of documents of title, e.g. pledging them as security for a private loan).

16. Are all physical assets insured?

TYPICAL EXAMINATION QUESTIONS

1. Budgetary control is often described as a system of "responsibility" accounting. Comment on this description indicating the problems which it presents to the management accountant.

(ACCA 6/65)

2. At the end of the first period after the commencement of manufacture of a new product, the following figures are extracted from a firm's books:

			Rs.
* (*)			8,000
			2,000
			1,500
			1,500
			1,000
	(******	* 0	500
	5.00		500
			2,000
			2,500

40% of the selling, distribution, and administrative costs are fixed, and a third of the factory overhead can be assumed to vary directly with production.

Draw up the figures according to:

- (a) an absorption cost presentation;
- . 210312

(b) a marginal cost presentation.

Why is there a difference in the profit figures?

- 3. What records are required for control of materials? Specify the information required by each person concerned with materials in a manufacturing organisation.
- 4. What costs are affected by a high labour turnover? How might these costs be controlled?
- 5. What are the advantages and disadvantages of including interest on capital in cost accounts for planning and control purposes?
- 6. A Company maintains a fleet of ten lorries, delivering tins of biscuits to retailers, and bringing back empty tins.
 - What factors should be taken into account in a system of cost control to embrace the cost of running, maintenance and depreciation? Recommend a suitable unit of measurement to be applied.
- 7. A boot and shoe manufacturer charges his overhead expenses to production on the basis of a labour hour rate fixed on the budget for the year. Each month the overhead over or under-absorbed

is analysed into expenditure variance and capacity usage variance. You are provided with the following data:-

		Actual
	Budget	July
	for year	1969
	Rs.	Rs.
Overhead expenses - variable with direct labour		
hours	100,000	7,500
- fixed	140,000	14,500
Direct Labour Hours	100,000	8,000
Calculate the overhead variances for July, 1969 –		
(a) assuming a fixed budget,		
(b) assuming a flexed budget.	(IC)	AC 6/70)

- 8. Design a control report for utilisation of assets in a printing works.
- 9. A firm purchases secondhand machines at auctions, reconditions them for re-sale by using spare parts removed from some machines, which are then scrapped, or by using new parts and motors. You are asked to recommend a simple system of stock control. Give your report.
- 10. A company manufacturing fabrics uses 100 different shades of raw material. The shades may be classified by usage into three groups as follows:-

Group	No. of shades	Average monthly usage per
	in group	shade (lbs)
A	10	1,000
В	50	200
C	40	50 (1)

Shades are purchased individually, and the minimum quantity that may be bought of one shade is 200 lbs. for which the price is Rs. 10 per lb.

If 1,000 lb. lots are purchased, there is a reduction of 5% on basic price, and if 2,500 lb. lots are purchased, the reduction is 10%. Purchases are delivered and charged in complete lots.

The formula for calculating the minimum stock of each shade is one-half of the monthly usage of that shade plus 10% of the usual order quantity.

Your company is considering changing from a buying policy of purchasing group A shades in 1,000 lb. lots, and groups B and C in 200lb. lots, to a policy of purchasing group A shades in 2,500 lb. lots, group B in 1,000lb. lots and group C in 200lb lots.

- (a) Calculate the savings on purchases and relate them to the increase in average investment in stocks which would result from the proposed change in policy.
- (b) List other factors that might be relevant to a decision about the size of individual purchase lots.

(ICWA-12/63-INTER)

11. Give the outline of a scheme for the planning and control of capital and exceptional revenue expenditure in an organisation where much of the work is executed in the factory's own workshops.

(ICWA IV 12/64)

12. Red Planets Ltd. makes light engineering products. It has some standard products, but also produces to customers' own specifications. It makes some of the components it assembles and buys others outside. Sub-assemblies are frequently made for store in advance of needs. A large number of different kinds of raw material is held.

The factory includes machine and assembly shops, a tool shop and maintenance shop.

The following difficulties have been experienced:-

- (1) The company has sometimes found that its bank overdraft is about to exceed the limit allowed under the agreement with the bank and in consequence it has had to alter its production schedules at short notice in order to produce goods that can be sold quickly for early payment. The disruption of production plans has increased average costs, and caused failures to meet delivery dates for other products.
- (2) Management does not think that the costing system gives a satisfactory indication of the relative profitability of different products.
- (3) Management also has doubts about the efficiency of some production departments, and complains that reports on actual product costs are provided so late that they are of little use.
- (4) The board of directors is dissatisfied with the long delay in producing annual accounts and the absence of interim accounts. The accounting department say that they cannot prepare accounts more often because clerical staff is not available for more frequent stocktaking of raw materials and work in progress a very lengthy job.
- NOTES: Financial accounts are prepared annually. There are no budgets. Product costs are calculated by charging direct costs to the production batches to which they relate, and allocating all other costs as a percentage of direct labour cost. The allocations are made, first to departments (where necessary) on the basis of the departmental direct labour cost and then to production batches. This basis is used (a) to obtain estimated cost for pricing purposes (8% being added to estimated total batch product cost for profit), and (b) to obtain actual batch costs.

You are required to report on the system of management information and make such proposals as you think appropriate. Your proposals should be as specific as possible.

(CMI 10/66)

13. The following chart is for the use of the foreman. Enumerate its faults as a method of presentation of this information:

Type No. 3412 Production Made Good: 994 Material loss for Month Ending 36th April, 1970 Date Presented-5th July 1970						
Process 1 3.38% Cause A 0.5%, ,, B 0.4%, ,, C 2.04%, ,, D 0.25%, ,, E 0.1%	Process 2	Process 3	Process 4			
	14.56% Cause A 0.65% B 1.26% C 1.79 % D 4.78% E 1.87% F 2.99% G 0.31% H 0.37% 1 0.13%	0.77% Cause A 0.2 % "B 0.32% "C 0.25 %	6.65% Cause A 4.28% ,, B 1.45% ,, C 0.71%			

14. The following monthly profit and loss accounts have been presented to the board of an engineering company making several products:

Profit and Loss accounts

	February 1966	March 1966	April 1966
Number of working days	20	23	19
Sales	Rs. 000 236	Rs. 000 350	Rs. 000 406
Cost of production: Variable standard:			
Direct material	67	78	66
Direct labour Overheads	39 27	46 31	38 25
Fixed	133 44	155 44	129 44
	177	199	173
Variances on standard	18	21 220	18
Selling and distribution and administration cost:		2 to 6	
Variable	25.	34	40
Fixed Total	79	88	54 94
Total cost	274	308	285
Stock increase at variable standard cost	28		
Stock decrease at variable standard cost			52
Cost of sales	246	308	337
Profit Loss	10	42	69
LUSS	10		

The total number of working days per annum is 240; The production and sales activities in total for the three months are at normal level;

It is the considered opinion of the board that although the accounts record the transactions of the company, they fail to show the profit earned (or loss incurred) month by month.

As consultant to the company you are required to:

- (a) express your views, in the form of brief headings, on the composition of, and results shown in, the accounts;
- (b) redraft the accounts to show the profit you consider should be presented to the board each month.
- **NOTES:** (i) any assumptions you consider it necessary to make are to be stated, with your reasons;
 - (ii) the basis of all calculations must be shown;
 - (iii) calculations are to be taken to the nearest Rs. 000.

(Adapted from ICWA 6/66)

15. Quasimod Ltd. assembles a single product from sets of purchased components. The unit standard cost of the article is shown in columns (A) below; it assumes the normal production programme of 4,000 units in each 40-hour week, and shows a standard net profit of Rs. 3/- per article. Hence the standard net profit for each four-week accounting period is Rs. 48,000 (i.e. Rs. 3 x 4,000 x 4).

The actual net profit for weeks 17–20 was Rs. 21,000. Accounting results for these weeks are shown in columns (B) below, and the following additional information is available:

- (1) A strike led to the withdrawal of all direct labour for the whole of Week 17. Supervisors reported for work and were paid as usual.
- (2) At the end of Week 17 the company agreed to a new wage rate of Rs. 4/25 per hour, and the strike was called off.
- (3) All workers worked two extra 8-hour shifts later in the period. Direct workers were paid time and a half for these hours; no payment was made to supervisors for these extra shifts.
- (4) All purchases of components and sales of products were at standard prices.
- (5) Stock levels were unchanged over the period.

		(A)		Rs.	(B)	
Selling price			Rs. 15	NS.	198,000	
Works costs:						
Purchased components		4/-		54,000		
Indirect materials (variable)		$0/12\frac{1}{2}$		1,650		
Direct labour (½hr @ Rs. 4/- per hour)		2/-		30,600		
Supervisor's salaries		1/-		16,000		
Variable factory expenses		0/50		6,600		
Fixed factory expenses		2/50		37,700		
			$10/12\frac{1}{2}$		146,550	
Works profit			4/871		51,450	
Other costs:					and the	
Administrative expenses		1/50		25,500		
Sales commissions (2½ % o sales)	f	$0/37\frac{1}{2}$		4,950		
			1/871/4		30,450	
Net profit			3/-		21,000	
					-	

You are required to prepare a statement explaining the difference between standard net profit and actual net profit for Weeks 17–20 in the way which you consider most helpful to management in locating and eliminating inefficiency.

(CMI 10/167)

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SUGGESTED ANSWERS

1. Budgetary Control has been defined as "The establishment of budgets, relating the responsibilities of executives to the requirements of a policy, and the continuous comparison of actual with budgeted results either to secure by individual action the objective of that policy or to provide a basis for its revision."

Budgeting means that the concern has consciously planned the sales of its product or service and has determined, or is trying to determine, a level of activity which is attainable taking into account the resources available, so as to provide the maximum return on the capital employed (or at least an acceptable return).

A budget system consists of a series of inter-related budgets representing each of the principal activities of the concern sub-divided where necessary into subsidiary budgets covering part only of an activity which may in their turn be divided into still smaller sectional budgets. Each budget represents a target for each activity which must be attained if the overall plan is to be fulfilled.

Each budget and subsidiary budget should represent, in physical and financial terms, the target performance of one manager or supervisor who is responsible for that section of the company's operations. It should be prepared with his full co-operation and represent a level of performance which he feels can be attained.

Details of actual costs incurred and results obtained should be collected and analysed for comparison with the targets laid down in each budget. The manager responsible for each budget is charged with the duty of taking any corrective action that is necessary to bring actual performance back into line with budget. For this reason budgetary control is often referred to as a system of responsibility accounting.

Budgetary control presents the management accountant with the major problems of first defining the cost or responsibility centres into which the business is divided. If there is an organisation chart in existence, this provides a basis for defining responsibility centres, but it is also necessary to define the precise duties and responsibilities of each such centre, as well as who is in charge. In many firms where expansion has been rapid the management structure will be complicated. Executives will have assumed responsibility for certain areas that logically would be outside their control. The management accountant would therefore have to analyse the area of responsibility of each executive, a task which calls for an immense amount of tact.

The second major problem is to co-ordinate the budgets prepared by each executive to ensure that each budget is integrated with the budgets prepared for other functions. The co-ordination will be a long process probably involving the re-writing of certain budgets as they prove inconsistent with the budgets for other functions or with the overall plan. Where the original budget for a budget centre is redrafted in this way the co-operation of the executive concerned must be enlisted as he would probably resent a budget that is forced upon him.

Allocating expenditure over the budget centres involves many problems of analysis and apportionment. The attention of the responsible executive should be drawn only to those items of expenditure over which he really has control. Reallocations and other items which are not controllable by the manager concerned (i.e. his decisions do not influence their level) should be clearly designated. They may be included in his budget for purposes of product costing, but it should be clearly understood that the manager's performance is evaluated on the controllable items only.

Where output is likely to vary widely it will be necessary to provide budgets for each of the more likely levels of activity to provide comparisons which are meaningful to executives. All variances disclosed should represent differences between budgeted expenditure at the actual level of activity attained and the expenditure incurred.

(a) Absorption Cos Presentation	st		(b) Marginal Cost Presentation		
Sales less prod'n costs:	Rs.	Rs. 8,000	Sales less variable prod'n costs:	Rs.	Rs. 8,000
direct material direct labour factory O/H	2,000 1,500 1,500		direct material direct labour variable factory O/H	2,000 1,500 500	
less closing stock	5,000	4.000	less closing stock	4,000	
500 @ $\frac{500}{2500}$ Gross profit	1,000	4,000	500 @ 4000	800	
less selling costs distb'n costs admin. costs	1,000 500 500	4,000 2,000	variable prod'n cost of sales variable selling costs variable distb'n costs variable admin. costs	3,200 600 300 300	4,400
Net profit		2,000	Contribution		3,600
			less fixed costs: factory O/H selling costs distb'n costs admin. costs	1,000 400 200 200	1,800
			Net profit		1,800

The marginal cost presentation shows Rs. 200 less profit than the absorption cost presentation because of the difference in stock valuation. In the marginal cost system, all fixed overhead is written off in the period to which it relates and none is included in the closing stock. In the absorption cost presentation, a share of the fixed overhead is carried forward in the closing stock valuation (in this example:

$$\frac{500}{2500} \times 1000 = 200$$

3. The storekeeper requires a continuous record of each separate stock item for which he is responsible, showing the balance that is supposed to be on hand. In case the balance disagrees with the physical verification, he needs also details of each receipt and issue, showing date, quantity and reference number, so that it can be established whether the official stock records are correct, and up-to-date or whether there is a loss for which he is accountable. This record is the bin card. If it is not kept actually on the bin, it will show also the location of the item in store.

The stock control section of production control will require a continuous record of each item it is responsible for requisitioning and delivery on time. The record will show all data used for stock control, viz., description of item, code no., supplier, and supplier's catalogue number, lead period, restrictions on order or delivery, order quantity, re-order level, maximum and minimum levels, date, quantity and reference number for all orders, receipts, issues, and appropriations before issue, plus balance on order, balance in hand, and free balance.

The cost accountant will require detailed costs of materials issued to production as soon as possible after issue, and the value of materials on hand whenever a Costing Profit and Loss account is prepared. For these purposes, a Stores Ledger account is opened for each significant item, and records kept of receipts, issues and balance on hand, both quantities and values, with dates and reference numbers.

The internal auditor requires continuous records of the balance in hand of each stock item, made up from sources independent of the store-keeper, so that he can verify physical stock balances at any time. He may also require records of the costs incurred in ordering and holding stock so that he can assess the efficiency of the system.

The financial accountant requires the total cost of purchases so that he may debit purchases and credit creditors, and he requires also the total value of raw materials in hand at the end of the financial year or at any time a Manufacturing and Profit and Loss account has to be drawn up.

Purchasing and Design should have detailed specifications and prices of all raw materials stocked, and keep these under review so that opportunities for using cheaper substitutes or alternative sources are not missed.

The materials controller should have all the information above.

- 4. The costs that are affected by a high labour turnover are as follows:-
 - (i) The remuneration of instructors. This may comprise the wages of skilled operators or foremen for that time which they have devoted to instructing new employees. In other cases there may be fulltime instructors.
 - (ii) The cost of materials and facilities provided solely for training purposes.
 - (iii) The wages of trainees.
 - (iv) Educational and outside training expenses. It may be necessary to send new employees on special courses. New employees in a data processing department, for instance, may be sent on a computer familiarisation course. Trainee typists may be sent to a secretarial college for training.
 - (v) The materials and overhead costs of excess defective work performed by trainees.
 - (vi) The cost of advertising for personnel.
 - (vii) Personnel department expenses.
 - (viii) Wages department expenses.

The costs listed above will be offset by the value of output of new employees up to the time when they are fully trained.

To inform management of labour movements a periodic statement containing the following information, and with comparative figures for preceding periods, could be prepared:

- (i) The average number of workers on the payroll in each department and in total during the period.
- (ii) The number of workers (a) who left, (b) who were dismissed and (c) the total of (a) and (b) during the period, also analysed by departments.
- (iii) The percentages of (ii) (a), (b) and (c) above to the average number on the payroll during the period, for the business as a whole, and by departments.
- (iv) Analysis, by reason given for leaving, or cause of dismissal, of the figures in (ii) above.
- (v) Cumulative figures for (i) to (iv) above.
- (vi) The comments of the Personnel Manager on significant features indicated by the figures and ratios in the body of the report.
- 5. Advantages of including interest on capital in cost accounts include:
 - (i) product costs are more comparable where they involve different amounts of capital, e.g. plant, equipment, working capital, etc. or for different periods of time, e.g. maturing stocks.

- (ii) costs are more comparable with the cost of buying in products or components since the latter include an interest or profit element.
- (iii) process costs are more comparable e.g. a mechanised process would appear cheaper than a manual process unless interest on the capital used in the mechanised process were included.
- (iv) for estimating and pricing, a profit margin should be added to cost; interest on capital employed at a suitable rate per annum may be included as a cost, thus avoiding the necessity of adding anything further.

Disadvantages

- (i) impracticable since a good deal of capital equipment, land, etc. is used *jointly* by more than one product, process, etc. and any apportionment is arbitrary.
- (ii) impracticable since the *amount* of capital employed is constantly varying, especially the working capital element.
- (iii) controversy over the rate of interest to be used, e.g. should the cost of marginal capital (such as an overdraft) be used, or the weighted average cost of all sources of capital?
- (iv) unnecessary, since comparisons of product profitability, make or buy in, process profitability, etc. should be based on marginal or incremental costs, not on full costs.
- (v) interest in closing stocks must be eliminated.
- 6. To control running costs, the following factors should be considered:
 - (i) who is responsible for running costs, e.g. the Transport Manager.
 - (ii) is it possible to fix a standard cost per mile for each type of lorry? e.g. petrol cost based on reasonable rates of consumption and expected cost per gallon; drivers' wages based on a reasonable monthly mileage and expected rates of pay; similarly other fixed costs such as insurance and licence fee. If this is too complicated, is it possible to fix a budget cost for the whole fleet, based on an expected mileage, and distinguishing between fixed costs and variable costs?
 - (iii) how far are these costs controllable by the Transport Manager?
 - (iv) how can actual costs and mileages be collected?
 - (v) is it necessary to control on an individual lorry basis?
 - (vi) how often should actual costs and standard or budget costs be reported to the Transport Manager?
 - (vii) what degree of variance analysis is possible and worthwhile (a) on a regular basis, and (b) on an ad hoc basis.

To control maintenance costs:

- (i) who is responsible e.g. Maintenance Manager.
- (ii) is it possible to fix standard costs for certain scheduled jobs and their mileage frequency, e.g. service checks every 5000 miles, new tyres every 10,000 miles, engine overhaul every 20,000 miles, etc.
- (iii) is it possible to set an overall budget for fleet maintenance to including also unscheduled jobs, distinguishing fixed and variable costs, and costs controllable by the Maintenance Manager from those not so controllable.
- (iv) how will actual costs be collected, e.g. by a system of job numbers.
- (v) frequency of reporting, degree of detail, and variance analysis, as above.

Depreciation may be charged on a straight line basis, or on a (capital cost - scrap value / expected total mileage). If depreciation mileage basis is charged on a straight line basis, the cost per mile will indicate the degree to which lorries are utilised.

7. (a) Overhead absorption rate = Rs. $\frac{240,000}{100,000}$ = Rs. 2/40 per hour.

Overhead variance

= actual overhead - overhead absorbed

$$= 22,000 - (8000 \times 2/40)$$

= Rs. 2800 ADV

Expenditure variance

= actual overhead - budgeted overhead

$$= 22,000 - \left(\frac{240000}{12}\right)$$

= Rs. 2000 ADV

Capacity usage variance

= (budget hours - actual hours) x overhead rate

$$= \left(\frac{100,000}{12} - 8000\right) \times 2/40$$

= Rs. 800 ADV

(b) Overhead variance as above Expenditure variance

= Rs. 2800 ADV

= actual overhead - flexed budget overhead

$$= 22,000 - \left[\frac{(140,000)}{12} + (8000 \times \frac{100,000}{100,000}) \right]$$

= 22,000 - 19,667= Rs. 2,333 ADV

Capacity usage variance

= flexed budget O/H - O/H absorbed

$$= 19,667 - (8000 \times 2/40) = \text{Rs.} 467 \, ADV$$

8.	MANAGEMENT AND ADDRESS OF THE PARTY AND ADDRES			
		Less		
9		Other		Date
19.	Short Working	Oper. Absent		
		Power Cut		Signed
	Analysis of	Break Down		Signec
	188 188 188	No Ins`tns		
		No Work		
ation -	Excess/	(Shortage)		
Press Utilisation	Budget	Hours		
Pr	Hours	Osed		
	Type		TOTALS	Form No. 4678
	No			Form

- 9. The following simple system of stock control is recommended:-
 - (i) Each machine, when received, should be inspected and a decision made whether to recondition or dismantle it; it should then be stored, pending the commencement of work upon it, in conditions which prevent unauthorised removal of parts.

- (ii) Spare parts required for machines undergoing reconditioning should be obtained from stores under a sound system of requisitioning.
- (iii) These machines which it is decided not to recondition should be completely dismantled, and all serviceable parts cleaned, greased and put into store, records being kept. Scrap should be sorted, weighed and stored for disposal.
- (iv) The storekeeper must keep records of quantities of all materials and spares, whether purchased new or obtained from dismantling, on bin cards written up from delivery notes, debit notes (dismantling) and requisitions.
- (v) There should preferably be kept in addition, independently of the storekeeper, a Stores Ledger recording values of materials and spares received and issued. In the case of spares obtained from dismantling, the values would have to be at estimated purchase prices, taking into account the age and condition of the items. An account for each machine purchased could be kept in a Job Ledger, showing in the case of those requisitioned, original cost, cost or value of spares and materials, labour and overhead; and in the case of those dismantled, original cost, labour, overhead and (credited) value of spares, and scrap obtained. This would enable the profit or loss derived from each machine to be ascertained.

10. (a) PRESENT POLICY	PROPOSED POLICY
Cost of materials per year Rs.	Rs.
A. 10 x 12,000 x Rs. 9/50 1,140,000	A. 10 x 12,000 x Rs. 9 1,080,000
B. 50 x 2,400 x Rs. 10 1,200,000	B. 50 x 2,400 x Rs. 9/50 1,140,000
C. 40 x 600 x Rs. 10 240,000	C. 40 x 600 x Rs. 10 240,000
2,580,000	2,460,000
Average stock (minimum stock plus	
half the order quantity)	
A. $500 + (10\% \times 1000)$ 600	A. $500 + (10\% \times 2500)$ 750
+ 1000 500	+ 2500 1250
2 1100	2 2000
$10 \times 1100 \times Rs. 9/50 = 104,500$	10 x 2000 x Rs. 9 180,000
B. $100 + (10\% \times 200)$ 120	B. $100 + (10\% \times 1000)$ 200
+ 200 100	+ 1000 500
2 220	700
50 x 220 x Rs. 10 110,000	50 x 700 x Rs. 9/50 332,500
C. $25 + (10\% \times 200)$ 45	C. $25 + (10\% \times 200)$ 45
+ 200 100	+ 200 100
2 145	2 145
40 x 145 x Rs. 10 58,000	40 x 154 x Rs. 10 58,000
272,500	570,500
Number of orders per year	
A. 10 x 12000	A. $10 \times \frac{12000}{2500}$ 48
1000	A. 10 x 2500
B. 50 x 2400 600	B. 50 x 2400
B. 30 A 200	B. 30×1000
C. 40 x 600	C. 40 x 600 120
C. 40 X 200 840	$\frac{1}{200}$ $\frac{1}{288}$

- (b) The size of individual purchase lots should be such as to minimise the total of:
 - (i) cost of materials
 - (ii) costs of holding stocks (incl. interest on capital)
 - (iii) costs of ordering

The proposed policy would reduce the cost of materials by Rs. 120,000/year and reduce ordering costs also, but the stockholding costs would be higher as the average stock level would increase by Rs. 298,000.

The following additional factors are relevant:

- (i) costs of holding stocks
- (ii) cost of placing an order and taking delivery
- (iii) availability of finance, space and other facilities required for the extra stocks
- (iv) existence of seasonal peaks, temporary shortages, or price fluctuations, all of which make it more economic to order larger quantities at particular times.
- 11. (i) Where capital expenditure is incurred in the firm's own workshops it is essential to separate out all materials, labour and overhead costs attributable to the assets being constructed, since this expenditure has to be capitalised. For each asset or item of work authorised a job card should be opened. Capital jobs should be clearly distinguished from revenue jobs, e.g. by a prefix to the job number.
 - (ii) Authorised costs and any necessary breakdown and phasing should be shown on the job card, so that this is the basis of control.
 - (iii) For projects involving many interdependent activities, a bar chart or network analysis should be made. This aids planning of both progress and costs and may be used also for control.
 - (iv) If there are a large number of capital jobs, a Capital Work in Progress Control account should be opened. The job cards then form the subsidiary records. Costs incurred on capital jobs will be picked up from material requisitions, labour analyses, overhead apportionments, and invoices for contractors' charges, materials delivered direct to site, etc. These will be posted in detail to the respective job cards and in total to Capital Work in Progress Control account.
 - (v) On completion of a job, the job card is closed and the total cost is credited out of Capital Work in Progress and debited to the appropriate asset account. At the same time the new asset is added to the Asset Register. (This is the point at which it starts being depreciated).

- (vi) It may be necessary to control capital expenditure not just on an accrual basis, but also on a commitments basis. When orders are placed for materials or equipment, these are recorded on the appropriate job card (or control schedule). When invoices are received the commitment is cancelled and the normal accounting entries are made. The reason for this more elaborate control is to ensure that total expenditure plus commitments outstanding do not exceed the authorised total.
- (vii) Management reports for the control of capital jobs must show progress as well as costs. If Rs. 100,000 is authorised for construction of a building, and Rs. 90,000 is spent, all might appear well, until it is reported that this was spent on the foundations only.
- (viii) Just as costs are examined with regard to progress, so progress must be examined with regard to time. Delay in executing a construction project adds significantly to its total cost, since interest on capital is higher, and planning and re-scheduling costs are also higher. It is better to plan once, and stick to the plan.

The following form may be regarded as an outline of a control report; details will vary in any particular case; also the format may be graphic (barchart, graph or network) rather than columnar:

	Date:		Comments	Sgd	
	orisation		Auth'd Comple- tion Date		
19	Auth Ref:	Progress	Est. Comple- tion Date		
		Prog	Actuae Prog. to Date		
report for	Responsible:		Unit of Measure- ment		
Capital control report for	Dept. Re		Auth'd cost (Incl. Contingency gency Rs.		
Cap	No.	Cost	Est. Completion Cost Rs.		
			Actual Cost to Date		. 8765
	Job/Project:	Itom	or Activity		Form No. 8765

12.

RED PLANETS LTD.

Board of Directors:

Report on Management Information System

- (1) The disruption of production plans by cash shortages can only be avoided by effective cash planning and control. This is best instituted as part of a comprehensive system of budgetary control in which each department is held responsible for keeping within its budgeted revenue or output, because the cash balance is affected by every activity of the firm. Without pre-planning and a firm commitment to plan, cash planning and forecasting is merely an academic exercise.
- (2) The profitability of different products can be compared if the costing system provides the contribution made by each product, (revenue minus variable costs) and the scarce resources it uses. Profitability of a product is the annual contribution it makes, divided by the capital (or other scarce resources) it uses. The contribution is disclosed by a marginal costing system, but this should be calculated without altering the present full cost system, since the latter is still required as a basis for pricing. It is only necessary to distinguish variable costs from fixed costs and to group the former and sub-total them on product cost statements.
- (3) The efficiency of production departments is best judged by comparing their actual costs with the budget costs, the latter being "flexed", or scaled up or down, depending on whether actual output is higher or lower than budget.

Reports on *product* costs should not be used for cost control; reports on departmental costs, comparing actual costs with budget, are better, since a product is not the responsibility of one man, who can be praised or blamed, whereas each department is the responsibility of its manager. Departmental cost reports can, of course, be provided earlier than product cost reports.

(4) Interim accounts can be prepared, and annual accounts can be prepared sooner, by using book values of stock, provided these are checked with physical stocks, a few items at a time throughout the year. This often provides a more accurate valuation of stocks than a 100% physical verification which is necessarily inexpert and rushed. Continuous verification, now widely adopted, is based on up-to-date stock records ("perpetual inventory") i.e. it is necessary to design a stock accounting procedure, including total or control accounts.

The above brief suggestions need to be expanded into a program of budgetary and accounting reform. If this is agreed by the Board, design and implementation may be expected to take from 2 - 5 years. I would recommend the use of a firm of management consultants to sell the idea of budgets to all

levels of management, since this involves a complete recasting of our managerial approach, and extensive re-orientation training is required. The consultants would also lay down the general program and timetable including any necessary changes in organisation, and get it moving.

Management Accountant.

13. There are faults both in the *relevance* of information and the *means* by which it is communicated.

The relevance of the information depends upon the decisions and actions that are intended to result from it. It is assumed that this is a report of process losses by cause, intended to direct the foreman's attention to reducing future losses. Faults of relevance include:

- (i) April losses are not likely to be still relevant in July.
- (ii) controllable causes are not distinguished from uncontrollable causes (i.e. at foreman level).
- (iii) the figures are not made significant by *comparison*, e.g. with standard or normal loss for each process, and for each cause within each process.
- (iv) the money significance is not shown.
- (v) the significance over time (trend), if any, is not shown.
- (vi) 2 places of decimals are *redundant* (and probably spurious) accuracy; decisions will be taken on variances or abnormal losses (best in money terms) probably to 2 significant figures only.
- (vii) the number of causes appears excessive, and may be due to non-standardised terminology on scrap reports, e.g. cause F may be "leakage" and cause G "seepage".

Faults in the means of communication include:

- (i) the *title* should be at the head, viz. PROCESS LOSSES FOR APRIL 1970.
- (ii) the author and addressee should be shown.
- (iii) causes should be *named* not coded, e.g. spillage, breakdown, bad materials, leakage, process fault. These could be preprinted in the first column and not repeated across the chart.
- (iv) only exceptions from standard or allowed losses should be reported; redundant data confuses the issue.

- (v) the percentages appear very small but might be extremely expensive; the effect would be greater if they were shown graphically, e.g. bar chart, subdivided by major cause, actual bar against standard bar.
- (vi) the percentages do not in all cases add to the total process loss.
- 14. (a) (i) The profit is calculated on marginal cost principles which, though controversial, are widely accepted. If an absorption cost basis had been used, the stock variations would include a share of fixed costs; this would reduce the loss in February to about 2, and reduce the profit in April to about 56.

(February:
$$\frac{28}{133+28} \times 44 = 8$$
; April: $\frac{52}{129+52} \times 44 = 13$)

- (ii) the variation in monthly profit is mainly due to the variation in sales revenue.
- (iii) though stock is valued and the profit is calculated on marginal cost principles, the presentation is not a marginal cost presentation (this is shown in (b) below).
- (iv) for inter-month comparisons, costs, sales and profit should be calculated per working day, or for a standard month of 20 working days, since the length of months varies considerably.
- (v) standards appear to be set only for production costs*; if standards were also set for selling, distribution and administration costs, and for selling prices and volumes, the profit could be compared and controlled against a standard profit.
- (vi) the production variances total Rs. 57,000 (18 + 21 + 18) over the 3 months compared with standard costs of Rs. 549,000 (177 + 199 + 173); this indicates that the standards are too difficult and need revision, or that controls are ineffective. If variances were detailed, it would be apparent which elements of cost need to be investigated.
- (vii) the standard fixed costs for each month should be based on the working days each month, rather than an equal amount each month.
 - *It is assumed that the fixed production costs shown are standard costs by month since this is a marginal standard costing system.

15.

QUASIMOD LTD.

Comparison of actual profit with standard profit for weeks 17 - 20

Standard profit: 16,000 units @ Rs. 3/	Rs.	Rs. 48,000
less profit margin lost on low volume,		40,000
(16,000 – 13,200) @ Rs. 3/-	8,400	
less high usage of purchased components	0,400	
54,000 (13,200 O B 4)	1 200	
	1,200	
less increase in wage rate	1 700	
6,800 hours @ Rs. 0/25	1,700	
less overtime premium 800 hours @ Rs. 2/12½	1,700	
less labour inefficiency (6,800 - 6,600) hours	000	
@ Rs. 4	800	
less supervisors' salaries spread over lower		
volume (16,000 – 13,200) @ Re. 1/	2,800	
less fixed factory expenses spread over lower		
volume (16,000 – 13,200) @ Rs. 2/50	7,000	
add saving on budgeted fixed factory expenses		
$(16,000 \ @, 2/50) - 37,700 \ \dots$		2,300
less administrative expenses spread over lower		
volume (16,000 – 13,200) @ Rs. 1/50	4,200	
less extra administrative expenses over budget	.,200	
25,500 - (16,000 @ 1/50)	1,500	
23,300 (10,000 @ 1/30)	1,500	The second
	29,300	50,300
	29,300	
		-29,300
Actual profit		21,000
Actual profit		21,000

SECTION VII

FINANCIAL ANALYSIS AND ACCOUNTING RATIOS

7.1 PURPOSE OF FINANCIAL ANALYSIS AND RATIOS

A financial ratio is a tool of analysis, a tool of planning, and a tool of control. Financial analysis is simply diagnosis of the state of the What are its strong points and what are its weak points? company. A financial ratio is like a thermometer: it measures a key condition of the company, which must then be interpreted. Note that the financial ratio in itself means very little: the skill in analysis comes in knowing what the ratio ought to be or the significance of a difference from one year to another, or from one firm to another. The accountant has rightly been called the "business doctor" since he examines the company, diagnoses the symptoms (data and ratios), and prescribes accordingly. This is a pre-requisite to company planning. For instance, before increasing the scale of operations, the accountant would check the company's liquidity. If this appeared low, it would be dangerous to start accepting larger orders, since these would require increased working capital and perhaps lead to insolvency ("overtrading"). Financial ratios are also used for forecasting and planning. If in the past, debtors have been 15% of sales then, given next year's budgeted sales, debtors can be budgeted. This of course, assumes that the past relationship will continue. Other factors affecting debtors, such as general economic conditions, must be taken into account.

A financial ratio is also a tool of evaluation and control, since variations in a ratio are usually significant. Adverse changes require corrective action; favourable changes should be exploited. For instance, a company's gross profit margin declines from 20% to 15%. This must be investigated. It could be due to higher purchase (or production) costs per unit, or lower selling prices, or to bad mix (selling more of the low-profit lines, and less of the high-profit lines). When the cause is established, corrective action can be taken.

Both for analysis and control, a ratio is *compared* with some expectation. This may be the budgeted ratio or a pre-determined standard, or simply the corresponding ratio last year or over a period of years (to reveal trends). In the developed economies, many firms take part in inter-firm comparisons made (usually) by a central agency (see Section 7.4). This enables firms to make themselves more efficient and competitive, and promotes economic development.

7.2 WHO NEEDS FINANCIAL RATIOS?

- (i) Management needs ratios to diagnose, plan, evaluate and control the business.
- (ii) Investors in the firm (ordinary shareholders and preference shareholders) and potential investors also use ratios to ascertain how well the company is doing from their point of view. For investors' ratios see Section 7.7.

- (iii) Creditors and potential creditors (trade creditors, banks, debenture holders, etc.) are not so much concerned with profitability as with the ability of the company to pay interest (if any) and repay the amounts due at the specified times. See section 7.5 on liquidity ratios.
- (iv) The public and its agents (Government agencies, research institutions, the financial press, etc.) are interested in the performance of companies from the point of view of public financial and economic objectives such as economic development and the balance of payments, and social objectives such as high employment, and equitable distribution of income and wealth.

In a sense, all ratios are management ratios, since management have to satisfy all the above groups.

7.3 TYPES OF RATIO

Ratios are of course simply the result of dividing one figure by another. The answer may be left as it is, or expressed as a percentage by multiplying by 100. The numerator (on top) and the denominator (underneath) are usually related in some way so that the ratio itself is not supposed to change. When it *does* change, this must be investigated, as it implies a change in the relationship of the two variables. The change may be either favourable or adverse to the objectives of the business.

Ratios may be formed by comparing one variable with another, e.g. sales with debtors, or advertising expenditure with sales. Since the business has two main economic objectives, viz, to make a profit, and to remain solvent, ratios can be classified as operating ratios (see section 7.4) and liquidity ratios (section 7.5).

Ratios can also be formed by comparing a variable with itself at a different time (called inter-period comparison e.g. this year's sales may be 110% of last year's sales), or with its budget (e.g. sales may be 95% of budget), or one firm with another (inter-firm comparison), or from one division of a firm to another (intrafirm comparison). Clearly, each basis of comparison will provide a new set of ratios. One may even compare a ratio with a ratio and derive a new ratio, but this is liable to be misunderstood. For instance, if last year's return on capital was 10%, and this year returns 15%, this might be expressed as a 50% increase in profitability. However this is liable to be interpreted as 10% + 50% = 60% this year; it would be better expressed as a 5 point increase in profitability.

Many of the most useful operating ratios use *physical* variables either in the denominator or both numerator and denominator, e.g. cost of production per ton, output per manhour, added value per man. These are used for planning and control at the relevant levels of management. The most useful physical variables are usually production quantity, sales quantity, number of employees (or labour hours), and raw materials usage.

7.4 OPERATING RATIOS

These are ratios which reflect (or contribute to) efficiency or profitability. Thus, contribution per unit of limiting factor is an operating ratio of basic importance. For instance, many firms calculate profit per employee (or on certain classes of skilled employee) as a measure of efficiency. (This can be broken down between sales per employee, and profit margin on sales, or between net assets per employee and profit on capital employed – see below). When the limiting factor is capital, return on capital employed is important. The latter is so widely used, it is often called the "primary ratio."

Return on capital employed is the same as profit on net assets, since all capital employed goes into net assets. (See section 2.5 on the various ways this ratio can be defined.) Profit on net assets may be analysed in various ways. The system of analysis used by Du Pont, one of the largest companies in the world, has undoubtedly contributed to their success, and many other firms large and small, now use the same method. The factors affecting profit on net assets are set out in a pyramid of ratios, on page 463.

This is the basic pattern, which can be applied to all firms. However, each firm has its own particular activities, and should devise its own tailormade pyramid of ratios, based on the above pattern. A trading concern, for instance, would not need (g), (h) and (i) but may substitute "gross margin on home sales" and "gross margin on export sales." Or it may analyse its margin by product, e.g. "gross margin on hardware", "gross margin on foodstuffs", "gross margin on soft drinks", etc. Thus, any drop in the overall gross margin can be traced to individual products or to their mix.

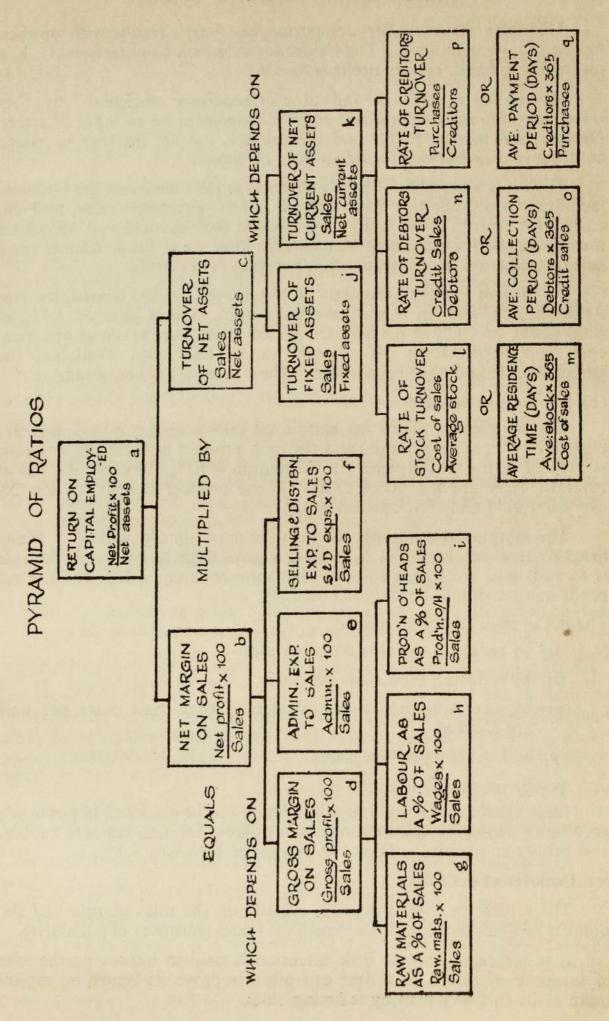
Inter-firm comparisons made by trade associations, etc. are based on a pyramid of ratios designed for the particular trade or industry. Usually, all participating firms are required to keep their financial and cost accounts on uniform principles (uniform costing) and to render accounts and data periodically for confidential analysis and comparison. Each firm gets back its own financial ratios and the corresponding ratios for the "average" firm. Ratios may also be interpreted, or possible reasons for variations given. Each firm thus gets the advantage of an in-depth analysis of its performance, and weaknesses and wastage spotlighted for action, without loss of secrecy.

(a) Return on capital employed

As explained in section 2.6 this primary ratio may be defined in a number of ways, depending upon who is to use the resulting ratio and for what purpose. If management need a ratio to show how well they have used the assets under their control to maximise profit after all charges, the most relevant definition is as follows:

Profit after tax but before charging interest or dividends

Total assets at current market value



This may be used for comparing one year's results with another, or one firm with another. The Centre for Interfirm Comparison (U. K.), on the other hand, prefers profit before tax.

Return on capital is an indicator of economic efficiency. In effect it measures the net output achieved by management on an input of assets. Depreciation is allowed for and the profit is the net increase in assets, before any distributions to the sources of capital.

Thus it is a measure of how well management have run the business, including how well they have utilised assets, generated sales, and cut costs. Of course, some factors are outside their control and allowance must be made for genuinely unavoidable losses, e.g. lower returns must be expected from tea companies if all market prices drop.

A study of the 1968 accounts of 150 quoted Ceylon companies (see Appendix) showed an overall average return in that year of 3.4% of total assets, or 4.1% of net assets. (Fixed assets were taken at historical cost, less depreciation. If current values had been available, the percentages would have been lower. These returns are net of tax.)

(b) Net margin on sales

The significance of the net margin on sales is that it reveals how far costs are covered by revenue, and for each product how far the unit cost is covered by the selling price. If the margin is 10%, for every Rs. 100 of revenue, there are Rs. 90 of costs. If the product is sold for Rs. 20, every one sold adds Rs. 2 to net profit.

The margin can be compared with the mark-up for pricing. Many firms fix their selling prices by adding a percentage to costs. If the rule is to add, say, 25%, then costs of 100 cause revenue of 125, and the net profit margin should be 20% (25 on 125).

The net margin can be improved:

- (i) by reducing variable costs per unit
- (ii) by reducing fixed costs per year
- (iii) by increasing the volume of sales, so that fixed costs per unit are reduced
- (iv) by increasing selling prices
- or (v) by improving the mix.

Sales figures are not (yet) legally required to be disclosed in published accounts. However sales figures are available for tea, tea-cum-rubber, and rubber companies. Their net margin in 1968 was 3.3%.

(c) Turnover of net assets

The return on capital depends equally on the sales margin and the number of times that assets are turned into sales (turnover of net assets).

It is surprising that so little attention is paid to improving the rate of turnover of assets, as a firm can often improve its return on capital more easily this way than by reducing costs.

Before explaining the significance of this ratio, it is essential to be clear on the terminology. "Turnover" by itself means sales revenue. However this revenue comes from purchasing or producing goods, then selling them. Profit is made each time goods are sold. If one thinks of the stock of finished goods, it is apparent that the total profit depends on the number of times that this stock is turned over, i.e. the number of times it is purchased, stored, sold, and replaced.

However stock is only one asset in the Balance Sheet. All other assets are also being turned over in order to generate these sales. Plant is purchased, used, scrapped and replaced. Similarly, vehicles, buildings and other fixed assets go through cycles of use and replacement. Each fixed asset has a given effective life cycle. Therefore in respect of fixed assets we increase profitability by achieving a higher revenue on these assets, i.e. by utilising them more intensively. If plant can be run on an extra shift, more goods, more revenue, and more profit can come from the same capital employed.

Turnover ratios are sometimes called "funds management" ratios as they relate to funds locked up in different classes of asset.

The turnover of net assets can be improved:

- (i) by increasing the volume of sales without a corresponding increase in fixed assets, e.g. by using space, production facilities, transport, etc. more efficiently and intensively to produce more goods and sales in the same period
- (ii) by reducing stocks, trade debtors, and cash as far as it is safe to do so, or holding them down while sales increase
- (iii) by increasing trade creditors without prejudicing purchases (which would in turn prejudice sales)
- (iv) by purchasing cheaper fixed assets, stocks, etc. without prejudicing sales, or by increasing selling prices

Turnover ratios vary widely from industry to industry. Highly capitalised industries such as public utilities may achieve only 0.2, good manufacturing firms might aim at 1.0 - 2.0 and trading firms rather higher.

Tea and rubber companies turned over their net assets 0.6 times in 1968. This reconciles with their 2.1% return on capital as follows:

3.3% sales margin x 0.6 times turnover = 2.1% return on capital.

(d) Gross margin on sales (or gross profit percentage)

In a trading concern, this ratio reflects the mark-up from purchase price to selling price. It is improved by buying (or producing) cheaper, selling dearer, or improving the mix of sales. Note that carriage inwards must be included in the purchase price since some items may be purchased at an ex works price and some at a delivered price (e.g. c.i.f.)

It can also be affected by the system of accounting for stock in trade. If the actual stock in hand is credited at the end of the year and there has been any loss of stock (physical loss or value loss), the gross profit margin will be lower. If losses are credited to the Trading account and debited (insofar as they are irrecoverable) to Profit and Loss account, the gross profit margin is preserved; only the net margin is reduced. Similarly, any change in the *basis* of stock valuation, e.g. from FIFO to standard price, will effect the gross profit margin.

In a manufacturing concern, gross profit (if calculated at all) means the difference between sales and production cost of sales. There is no standard definition of what enters into production cost, but usually it will include not only materials, labour and variable overhead, but also fixed production overheads, such as factory rent, salaries, and depreciation of plant and machinery. Therefore, the gross (manufacturing) margin is improved not only by reducing costs or increasing prices, but by increasing volume, so that the fixed costs per unit are reduced.

Net margin (ratio(b)) equals gross margin (ratio(d)) minus administration expense to sales (ratio(e)) and selling and distribution expense to sales (ratio(f)).

Gross margin (d) plus raw materials as a percent of sales (g) plus labour as a percent of sales (h) plus production overhead as a percent of sales (i) equal 100%.

The profit/volume ratio is given by

sales minus variable costs

This is very similar to the gross profit margin on sales. The only difference is that gross profit in a manufacturing concern is usually after deducting fixed production costs. The P/V ratio can be calculated for the firm as a whole, and for each product or service sold. It indicates the relative profitability of products in terms of sales revenue (see section 2.5 (vii)).

(e) Administration expense to sales

Most administration expenses are fixed, so this ratio is not expected to remain constant. If sales increase and the ratio falls, it is still necessary to ascertain whether this is disguising an increase in costs. For this reason, the absolute figure of costs is more useful than the ratio to sales.

(f) Selling and distribution expense to sales

Some selling and distribution expenses are variable with sales, e.g. commission, packing, and carriage outwards, but most are fixed. Fixed costs are more easily planned and controlled in absolute terms than as percentages of sales, etc.

Selling expenses will tend to be higher in a firm that makes consumer products than in a firm making industrial products, since in the latter case the number of customers to be influenced is usually smaller. Distri-

bution expense will depend on the channels of distribution; sales to wholesalers will naturally require less transport and warehousing costs than sales to retailers.

(g) Raw materials as a percentage of sales

In a manufacturing concern, the production cost of sales may be analysed into its constituent elements. If a variation in production cost is found to be due to materials, this in turn may be analysed between a price variance and a usage variance.

It is not always easy to establish the materials cost of sales, since accounts usually show the materials cost of production. The overall cost of production is then converted to cost of sales by adding opening stock and deducting closing stock. Usually accounts do not split opening and closing stock between the elements of cost. If opening and closing stock are about the same, it may be possible to ignore the materials element, i.e. take materials cost of sales as equal to the materials cost of production. If opening and closing stocks differ, the materials cost of sales may be estimated by multiplying the materials cost of production by

(production cost of sales ÷ cost of production)

e.g. :	Materials Labour Overhead	••	1,500 1,000 500
	Cost of production Add: opening stock Less: closing stock		3,000 1,000 2,000
	Production cost of sales Admn. expenses Selling & distrib'n exp.	••	2,000 200 200
	Profit		2,400 600
	Sales		3,000

The quantity produced consumed 1,500 materials, but the quantity sold was less, as stock was built up. Assuming that the materials content of opening and closing stock is the same as the materials content of production,

materials as a % of sales =
$$\frac{2,000}{3,000}$$
 x 100 = $33\frac{1}{3}\%$

(h) Labour as a percentage of sales

This refers to direct labour only.

This ratio is calculated similarly, viz.

$$\frac{2000}{1000 \times 3000} \times 100 = 22\%$$

Variations must be due to differences in rates of pay, or to the efficiency with which labour is made productive.

The ratio for a labour intensive concern will naturally be higher than for a capital intensive concern.

(i) Production overhead as a percentage of sales

In the above example the ratio is

$$\frac{2000}{3000} = 11\%$$

Variations must be due to differences in variable overheads per unit (which in turn may be to price or usage), or to fixed overheads, or to volume (capacity usage).

The ratio for a capital intensive concern will be higher than for a labour intensive concern. Production overheads will include depreciation on machinery, but not (usually) interest on capital, so a capital intensive concern should show a higher margin on sales, both gross and net, and a higher return on capital.

(j) Turnover of fixed assets

This ratio reflects the level of *utilisation*, of fixed assets, e.g. the number of hour's use made of plant as a percentage of number of hours available, and the *efficiency* with which those hours were used to produce saleable output. It can be analysed over land and building, plant and machinery, and vehicles. This financial ratio is often converted into physical terms. Each firm isolates its key assets and measures how well they are utilised. A cold store will measure cubic feet used/total cubic feet available. An airline measures ton-miles used/total ton-miles available (the "load factor").

Tea and rubber companies turned over their fixed assets 0.8 times in 1968. In standard costing, the utilisation and efficiency of use of production capacity may be expressed in physical ratios: see section 7.8

(k) Turnover of net current assets

This reflects how well management have managed their working capital funds, by keeping them small and turning them over several times in the year. (Tea and rubber companies turned over their current assets 1.9 times).

(1) Rate of stock turnover

This indicates the number of times in the year that the average quantity of stock has been sold and replaced. A typical rate for durable goods is 6 times a year, but it varies widely between industries. Firms that produce standard products for stock will show lower rates of turnover than firms that produce to order, since the latter will tend to despatch goods immediately on completion. (On the other hand, production to order usually implies shorter production runs, therefore higher production overheads to sales). Service industries (e.g. hotels) will have extremely high rates of stock turnover since their only stocks will be consumables, such as food, drink, cleaning materials, etc. (Also materials will be less important than labour and overheads in their total costs).

"Stock" in a manufacturing concern comprises raw materials and consumable stores, and work-in-progress, as well as stocks of finished goods. Rates of turnover should be calculated for each of these. Turnover of raw materials and consumable stores may be improved.

- (i) by ordering smaller quantities at more frequent intervals e.g. high usage items may be delivered daily or weekly (this reduces the average stock without prejudicing production, but may increase ordering and expediting costs see inventory control, section 6.12);
- (ii) by purchasing materials to standard specifications according to the production program;
- (iii) by weeding out obsolete, damaged and excess stocks for disposal;
- (iv) by increasing production volume without a corresponding increase in stocks;
- (v) by a more favourable mix, i.e. produce proportionately more of those goods and services which require less materials per rupee of sales.

The turnover of work-in-progress depends mainly on the production cycle. This would be very short, a matter of hours, in a bakery; in a textile finishing plant it might be 10 days; in a civil engineering contract it could be 6 months or more, and the rate of turnover of work-in-progress might be only once or twice a year. Sometimes the average production cycle is longer than it need be because of changes in priorities, or hold-ups due to shortages; the rate of turnover can be improved by good production planning and control.

The rate of turnover of finished goods can be increased

- (i) by having short production runs at more frequent intervals (the advantage from this must be balanced against higher production overheads)
- (ii) by gearing production closely to regular and reliable sales forecasts so that no stocks lie unsold for an undue period or become obsolete Digitized by Noolaham Foundation.

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- (iii) by weeding out obsolete, damaged and excess stocks for disposal
- (iv) by increasing sales volume without a corresponding increase in stocks
 - (v) by a more favourable mix, i.e. produce proportionately more of goods with a high rate of turnover.

Rate of stock turnover is sometimes measured as sales/average stock so that the same numerator is used for the turnover of all assets. This is not so useful as a measure of inventory management as the turnover can appear to vary merely by changes in price. However published accounts may not reveal the cost of sales.

Average stock is usually taken as the average of opening and closing stocks, but in some cases this is not a good approximation (e.g. perishable goods with a high rate of turnover). Another method, simpler but more liable to random fluctuation, is to take end-of-year stock instead of average stock. Tea and rubber companies in 1968 had a sales/end-of-year stock ratio of 3.8 times.

(m) Average residence time

The average residence time is an alternative to rate of stock turnover. It indicates the average number of days that stock remains on hand before being used. It is the reciprocal of the rate of turnover, converted to months by multiplying by 12, or to days by multiplying by 365.

As before, it can be calculated separately for each class of stock. If the rate of turnover of raw materials is 6 times a year, work-in-progress is 12 times a year, and finished goods is 3 times a year, this means that raw materials remain in stock for 2 months on average, that the production cycle is 1 month, and that finished goods remain in store for a further 4 months on average before being sold.

This ratio has the advantage that it is additive:

$$\frac{\text{Raw material stocks}}{\text{Cost of sales}} + \frac{\text{WIP}}{\text{Cost of sales}} + \frac{\text{Finished goods stocks}}{\text{Cost of sales}}$$

$$= \frac{\text{All stocks}}{\text{Cost of sales}}$$

In the above case, the residence time of all stocks is 7 months (2 + 1 + 4 months).

(n) Rate of debtors turnover

This is analogous to rate of stock turnover. In effect it is the number of times in the year that sales have been invoiced to the amount of current debtors outstanding, and cash collected. (Average collection period is its reciprocal and is easier to understand – see below). This ratio is used to assess the performance of credit control and collections. If they do their job well, customers pay earlier so, for a given volume of sales, debtors are lower and the rate of turnover is higher.

Note that the numerator is credit sales only (if this figure is known), since debtors relate to these and not to cash sales. Sometimes, total sales is used, but the ratio of total sales to debtors will then be affected by the proportion of credit sales in the total.

It is perhaps surprising that end-of-year debtors are usually taken instead of average debtors – the latter would avoid random fluctuations in the level of debtors at one point of time.

Tea and rubber companies total sales/end-of-year debtors ratio was 16.2.

(o) Average collection period

This is the average period from invoicing a customer to receiving payment. It may be added to the average residence time for all stocks to get the total period from receiving materials in store, through production and sale to the final receipt of cash. These are very important ratios in determining the amount of finance required for working capital (see also average payment period below).

A turnover of 16.2 implies an average collection period of

$$\frac{1}{16.2}$$
 x 365 = 23 days.

Another name for this ratio is "number of days' sales outstanding". If sales are being invoiced and collected at an even rate, it can be seen that on the last day of the year, cash will have been received for all but the last 23 days' sales, since this is the collection period.

The trend in this ratio is more significant than whether it is high or low compared with firms operating in different markets.

(p) Rate of creditors turnover

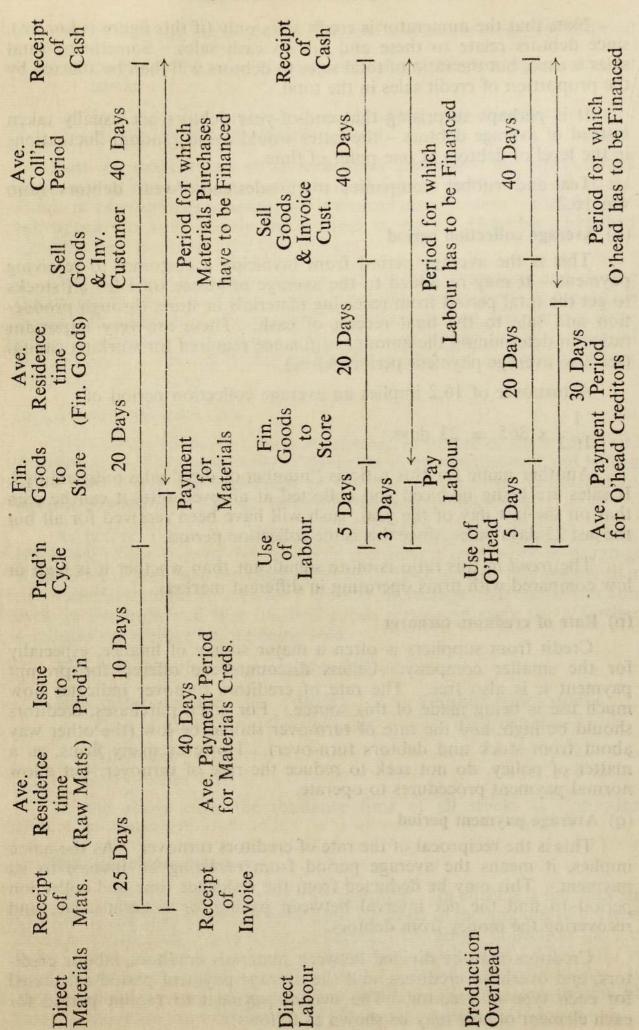
Credit from suppliers is often a major source of finance, especially for the smaller company. Unless discounts are offered for prompt payment it is also free. The rate of creditors turnover indicates how much use is being made of this source. For given purchases, creditors should be high, and the rate of turn-over should be low (the other way about from stock and debtors turn-over). However many firms, as a matter of policy, do not seek to reduce the rate of turnover, but allow normal payment procedures to operate.

(q) Average payment period

This is the reciprocal of the rate of creditors turnover. As the name implies, it means the average period from receiving an invoice to its payment. This may be deducted from the residence time and collection period to find the net interval between paying for materials, etc. and recovering the money from debtors.

Creditors may be divided between materials creditors, labour creditors, and overhead creditors, and the average payment period calculated for each type of creditor. The overall payment to receipt period for each element of cost may be shown as follows:

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Similar diagrams can be made for administration overhead, and selling and distribution overhead. Several assumptions are made above. For example, that all direct materials are issued to production at the start of the production cycle (in practice, materials may be issued at different stages of the cycle, e.g. for assembly type operations). Labour and overhead are assumed to be added at an even rate throughout the production cycle, so the average rupee is accrued half way through the cycle. Note the short payment period for direct labour: when labour is paid at the end of each week the period between accruing the average labour hour and its payment is 3 days. If labour were paid at the end of the following week the average payment period would be 10 days.

7.5 LIQUIDITY AND GEARING RATIOS

Liquidity ratios express the ability of the firm to pay its debts as they arise. Short term liquidity ratios are used by short term lenders such as trade suppliers, banks providing overdraft facilities or lending on trade bills, and other institutions which grant credit or lend money for repayment within the short term (generally within 12 months).

- (i) the current ratio is current assets divided by current liabilities. If current assets (stocks (including work-in-progress), debtors and prepayments, marketable securities, cash and bank balances) are at least twice the current liabilities (trade creditors, accruals, bank overdraft, tax and dividend creditors), this is regarded as safe, since all current liabilities can be paid out of current assets as they are converted to cash, with a margin of safety ("cover").
- The 2:1 minimum is a rule of thumb, and not the only evidence of a firm's ability to pay current obligations. Better evidence if it is available, is a month-by-month cash forecast showing obligations being met as they arise. Also a firm's debt capacity (its ability to raise further loans) is relevant, since old loans may be repaid out of new ones.

A prospective lender looks for a 2: 1 ratio after making the loan, i.e. current liabilities should include the proposed loan. In many cases, of course, the loan goes into stocks and other current assets, so the loan should be added into both assets and liabilities.

- 150 Ceylon companies in 1968 had an overall current ratio of 3.5 to 1. Tea and rubber companies showed 2.6, but most other categories were even more liquid, especially investment trusts, and finance and land.
- (ii) the quick assets ratio (also called liquidity ratio, or acid test ratio) is the ratio of quick assets (all current assets except stocks) to current liabilities. This is a more stringent test, to be used where the value of stocks is in doubt, or whether they will be realised in cash in time to meet current liabilities. Quick assets such as debtors and prepayments, marketable securities, cash and bank balances are either cash or "near cash", i.e. they are available for payment of creditors sooner than stocks (which must first be turned into debtors).

Quick assets should be at least equal to current liabilities, i.e. a minimum of 1:1.

As before this ratio is a rule of thumb, to be interpreted with reference to the particular firm and its circumstances.

150 Ceylon companies showed 1.9 quick assets to 1 of current liabilities in 1968.

Long term liquidity ratios are used by medium and long term lenders who provide capital, usually in the form of mortgage debentures or floating charge debentures. Their main interest is that interest is paid regularly, and that in the event of default the assets will realise sufficient for repayment of the principal.

Long term liquidity ratios are also gearing (or capital structure) ratios, since they all reflect the proportion of long term debt in total capital employed (See Section 5 on sources of finance). Considerably higher gearing is allowed in Ceylon in certain cases than is conventionally allowed in countries with larger capital markets;

(iii) net tangible assets ratio is the ratio of long term debt to (fixed assets (net of depreciation) excluding goodwill patents and trademarks, plus current assets, minus current liabilities and future tax reserve). It is an indication of asset cover available to debenture holders in a winding-up. If the net tangible assets ratio is 1 to 3 (regarded as a maximum in the U.K.), this implies that the assets could fail to realise up to $66\frac{2}{3}\%$ of their book value without prejudice to the debenture holders.

As a gearing ratio, it indicates that no more than Re. 1/- in Rs. 3/- should be provided by long term debt, i.e. at least Rs. 2/- out of Rs. 3/- should be provided by shareholders;

(iv) the ratio of long term debt to net worth or debt/equity ratio is long term debt divided by (ordinary share capital and preference share capital, plus capital and revenue reserves other than future tax reserve).

This is related to the net tangible assets ratio. If the latter must be not more than 1 to 3, the debt/equity ratio must be not more than 1 to 2, as follows:

Balance sheet

Ordinary shares	XX	Net tangible assets
Preference ,,	XX	(fixed + current assets)
F		(- current liabilities)
Free reserves	XX	(- future tax reserves)
Net worth	2	
Long term debt	ī	
at the notice that the	itela i an	
	3	

The Development Finance Corporation of Ceylon grants long term loans in suitable cases of 2 of debt to 1 of equity, i.e. four times the U.K. gearing limit may be allowed. The gearing limit in Ceylon depends rather more on the type of industry (how stable are its profits?) than on conventional ratios.

In 1968, 150 Ceylon companies had an average debt/equity ratio of 0.5 to 1.

(v) the ratio of interest times covered is the ratio of net profit to interest on long term debt. "Net profit" here means profit available to debenture holders and shareholders, i.e. after interest on any overdraft, but before deducting debenture interest. Both net profit and debenture interest are usually taken before tax.

The ratio reflects the income cover for the debenture interest, i.e. the degree to which annual net profit could fall in a bad year without prejudicing the payment of interest. In the U.K., lending institutions expect interest to be covered at least 5 times, i.e. profits could fall up to 80%, and debenture interest could still be met without turning the profit into a loss.

Interest times covered is calculated for a proposed loan in addition to its asset cover ratio ((iii) or (iv) above). The loan must be adequately covered by assets, and the interest must be adequately covered by expected profits, otherwise the firm is over-geared.

7.6 OTHER BALANCE SHEET RATIOS

Liquidity and gearing ratios (except interest times covered) are sometimes classed as Balance Sheet ratios. The distinction between Balance Sheet ratios and Profit and Loss account ratios is not very useful as all turn-over (funds management) ratios require both Balance Sheet and Profit and Loss account. However there are various other significant ratios which may be drawn entirely from the Balance Sheet.

(i) Fixed assets (net of depreciation) to current assets

This ratio varies widely from one industry to another. In tea and rubber companies in 1968 it was 2.3 to 1, while other industries had only 1 of fixed assets to 2 or 3 of current assets. Manufacturing firms might be expected to have a high proportion of fixed assets, especially if manufacturing methods are capital intensive, while trading firms would be expected to show low fixed assets, and relatively high stocks and debtors. This is contradicted by the 1958 study, in which Stores and Suppliers showed the same, 1: 3 ratio as Engineering Motors and Industrial.

The ratio is significant in both interfirm comparisons and interperiod comparisons. If a tea firm showed only 1 to 1, this could mean that factories were highly depreciated, perhaps obsolescent, and/or that it had high stocks of unsold produce.

Another possible reason for low fixed assets is that land and buildings (and even plant, vehicles and equipment) may be rented instead of purchased.

If fixed assets appear too high, they may be under-utilised. Check the turnover of net assets ratio.

Where a business has main assets which are used and replaced on a definite cycle, the proportion of fixed assets (net of depreciation) may be expected to fall during the cycle, then jump up on replacement, and so on. Many large businesses however will be investing in new plant, buildings, etc. fairly steadily as they fall due for renewal at different times. Check the ratio over a period of (say) 10 years. Expansion, as opposed to replacement, should not have so much effect on the fixed/current assets ratio (unless the firm is diversifying into new lines of business).

(ii) Fixed assets to net worth

One principle of finance is that permanent assets should be financed out of permanent capital. The ratio of fixed assets (net of depreciation) to capital (ordinary and preference) plus free reserves shows whether this principle is being observed. If fixed assets are not wholly covered by net worth, they should at least be covered by net worth plus long term debt. (If they are not it implies that current liabilities exceed current assets). Some analysts prefer to take net assets net of any long term debt specifically charged on those assets, e.g. a mortgage on land. Sometimes goodwill is omitted from the fixed assets.

In 1958, the net worth of 150 Ceylon companies covered their fixed assets 1.4 times.

(iii) Stocks to current assets

This is a useful supplementary ratio to the rate of stock turnover. An increase in the proportion of stocks to current assets over a number of years could indicate an accumulation of surplus or obsolete stocks. On the other hand it could be due to a change in the channels of distribution such as cutting out the wholesaler.

7.7 INVESTORS' RATIOS

It might be thought that an ordinary shareholder would be mainly interested in the percent return on capital (strictly the equity profit on equity capital) since this is the source of his dividends. The more profitable the company, the larger and more reliable the dividend, and/or the more profits retained in the business (these drive up the value of shares, giving holders an eventual capital profit).

It is true that the equity shareholder is interested in profitability, but he does not rely on book values as a measure of capital employed. Since he has paid (or is thinking of paying) a certain price for his shares, this is his capital, which can then be related to expected dividend, or to expected net profit available for distribution.

(i) Dividend yield = $\frac{\text{Expected dividend per ord. share (in Rs.)}}{\text{price of share}} \times 100$

The dividend (which is before dividend tax) is often taken as the current dividend, but the rational investor looks to future dividends, which may be more or less.

The ratio is usually expressed as a percentage. This should be clearly distinguished from the rate of dividend declared. This latter is based on the nominal value of issued shares not their market value. Companies are not required to show the market value of all issued shares in the Balance Sheet. If they did, the book value of assets, less current and long term liabilities and preference shares, would usually be found to be less than the share market value.

The dividend yield on a preference share is the expected dividend (nominal rate multiplied by nominal value), divided by its price. Note that the price may be more or less than the nominal price, so the dividend yield may be less or more than the nominal rate of dividend.

(ii) Earnings yield = $\frac{\text{Expected earnings per ordinary share}}{\text{price of share}} \times 100$

Earnings per share means net profit after interest, company tax, and gross preference dividend, but before tax on any ordinary dividend, divided by the number of ordinary shares in issue.

The reciprocal of the earnings yield is the *price/earnings ratio*, e.g. if a company's earnings yield is $12\frac{1}{2}\%$, its price/earnings ratio is 8.

The earnings yield on a preference share is the same as its dividend yield.

(iii) Dividend cover = Expected earnings per ordinary share (Rs.) Expected dividend per ordinary share (Rs.)

or Earnings yield (%)
Dividend yield (%)

A typical cover is 2, i.e. out of every Rs. 200 profits available for dividend, Rs. 100 is distributed, and Rs. 100 is retained and invested (ploughed back) in the firm.

An investor looks for a well-covered dividend so that he can expect his dividend to be maintained even in hard times.

(iv) Priority percentages are the percentages of net profit (before debenture interest) allocated successively to debentures, preference shares, ordinary shares and to reserve.

For example, a company has to meet Rs. 10,000 debenture interest, preference dividend is Rs. 5000, and normal ordinary dividend is 10% on Rs. 200,000 shares = Rs. 20,000. Net profit is Rs. 50,000. Priority percentages are as follows:

Debentures Preference Ordinary Reserve 0-20 20-30 30-70 70-100

This set of percentages shows the cover or "backing" for each class of capital. The debenture interest is covered 5 times $(\frac{100}{20})$, the preference divided 8 times $(\frac{80}{10})$, and the ordinary dividend only $1\frac{3}{4}$ times $(\frac{70}{40})$. The debenture interest times covered is at the minimum acceptable level (see 7.5 (iv) above); preference dividend is adequately covered; the ordinary dividend may be thought to be inadequately covered compared with other firms in the same industry.

If profits dropped to Rs. 30,000, and the ordinary dividend is maintained, Rs. 5000 would have to be drawn from reserve. The priority percentages would appear as follows:

Debentures Preference Ordinary Reserve 0-33 33-50 50-117 117-100

This shows the inadequate cover for each class of capital.

7.8 RATIOS USED IN STANDARD COSTING

(i) The efficiency ratio = $\frac{\text{Standard hours of output}}{\text{actual hours}} \times 100$

This reflects the efficiency of production. The efficiency ratio affects the "labour efficiency in time worked" variance, and the overhead volume efficiency variance.

(ii) The actual usage of budgeted capacity ratio $=\frac{\text{Actual hrs.}}{\text{budgeted hrs}} \times 100$

This reflects the utilisation of budget capacity. It affects the labour idle time variance, and overhead capacity usage variance.

(iii) The activity ratio = $\frac{\text{Standard hrs. of output}}{\text{budget hours}} \times 100$

This comprises both efficiency and capacity utilisation. It affects the labour efficiency variance (both efficiency in time worked and idle time), and overhead volume variance (volume efficiency and capacity usage).

(iv) Actual hours can be compared not only with budgeted capacity, but with maximum capacity:

Actual capacity usage ratio = $\frac{\text{Actual hours}}{\text{maximum possible hrs.}} \times 100$

- (v) Standard capacity usage ratio = $\frac{\text{budget hrs.}}{\text{maximum possible hrs.}} \times 100$
- (vi) Calendar ratio = $\frac{\text{actual working days}}{\text{budgeted working days}} \times 100$

This affects the overhead calendar variance.

7.9 LIMITATIONS AND MISUSE OF RATIOS

The first limitation is that information to calculate ratios is not always available. The outside investor, creditor or public agency is usually limited to the information in the published accounts, supplemented perhaps by the directors' report and any prospectus inviting the public to subscribe for shares or debentures. The Companies Ordinance does not even require the disclosure of sales turnover on which so many ratios depend. (This is now required in the U.K. by the 1967 Companies Act).

It is important to ensure that like is being compared with like. For instance, one lending institution reported loans outstanding/total loans made (in all years) as a measure of how efficiently it was recovering loans. Naturally it would appear to be getting more efficient every year as the total loans would continue to accumulate. Better would have been loans in arrears/loans outstanding. This is particularly difficult in interfirm comparisons except where uniform costing applies. It also applies to inter-period comparisons in the same firm, as account classifications, methods of absorbing overhead, etc. vary over the years, and distort comparisons. Some of the principal points for attention are as follows:

- (i) fixed asset values may be very different from net book values. Current values may sometimes be approximated by taking the value used for fire insurance purposes, or capitalising the gross annual value used for rating purposes, or applying a suitable index to convert prices in the year of purchase to current prices. (The outsider will not know the year of purchase, but may be able to estimate it from the accumulated depreciation on a single asset).
- (ii) even stock values are very uncertain since auditors are not usually able to judge whether stocks are obsolete or surplus (in 1968, stocks were 8 times net profits; a slight over-valuation of stocks has a multiplier effect on the net profit).
- (iii) debtors are usually correctly valued since any competent auditor can check that they have been actually received.
- (iv) the assets in the Balance Sheet do not include rented assets, so return on capital comparisons may be distorted, e.g. both firm A and firm B may make 5 profit on 100 assets but if firm A's profit is after deducting 2 rent on 20 of buildings, it has really made 7 on 120 of assets, both owned and rented, i.e. about 6%. (See section 5.4 re "Off the Balance Sheet" finance).
- (v) turnover ratios are very susceptible to seasonal and end-of-year fluctuations. An increase in the rate of sales at the end of the year will increase stocks and debtors, temporarily reducing apparent rates of turnover.
- (vi) a firm may deliberately "window-dress" its Balance Sheet. It is common practice to press debtors for payment before the year end so as to show higher liquidity in the Balance Sheet for the benefit of future borrowing operations.

Note that this does not affect current assets in total, or the liquidity ratios described above; it merely increases cash holdings. If the current ratio is over 1, it may be increased by paying off creditors as far as possible before the end of the year (this is coupled with the liquidation of debtors above). However, if the firm is very illiquid (current ratio less than 1) the current ratio is worsened by this practice,

DATA ON RUPEE COMPANIES - 1968 (RUPEES THOUSANDS)

		Mot		Issued	Capital	ı	Loan (Capital	Cred	Creditors
Section of Share List	No. Of Co's.	Profit or (Loss)	Sales	Ord. Shares	Pref. Shares	Free Reserves	Deben- tures	Bank	Long	Short
(1)	(2)	(3)	4	(5)	(9)	(7)	(8)	(6)	(10)	(11)
Tea Tea-cum-Rubber Rubber Rubber Rubber Tea-cum-Rubber	85222	3,290 1,534 699 144	122,301 36,669 11,201 2,211	80,964 30,627 13,419 3,374	3,389 520 125 72	55,763 28,294 9,426 2,764	2,365	2,975	21,401 5,091 1,457 999	24,337 7,009 2,949 364
Above four Sections Coconut Beverages, Food, Tobacco Engineering, Motors & Industrial Finance and land Hotels Investment trusts Miscellaneous Stores & Supplies	20 16 16 16 16 16 16 16 16 16 16 16 16 16	5,667 641 9,485 9,490 1,384 1,384 2,728 1,617	22 X X X X X X X X X X X X X X X X X X	128,384 6,607 53,276 42,641 11,757 10,481 14,198 21,828 13,960	4,106 7,236 1,425 1,453 2,446 47	96,247 9,486 37,041 34,852 3,284 7,742 16,876 8,425	4,260 603 3,119 18,926 1,000 500	2,604 2,604 268 38,893 8,462 15,886 6,172	28,948 3,497 40,369 42,326 5,231 1,108 17,567 6,446	34,659 1,056 36,111 40,453 6,338 1,491 7,630
Total	150	32,079	N/A	303,132	17,571	214,207	28,408	72,285	145,492	106,091

APPENDIX

		ASSETS	SJ		0					
Section of	Fixed	Invest-	Stocks	Debtors	Cash	Net	Current	Quick	Equity	Debt
share list	Less Dep n (12)	ments (13)	(14)	(15)	(16)	Assets (17)	Assets (18)	Assets (19)	(20)	(21)
Tea Tea-cum-Rubber	129,808	7,902	34,835	7,107 2,460	11,538	166,857 65,844	61,382 20,430	26,547	140,116 59,441	26,741 6,403
Rubber (Malay)	21,035 5,050	1,076	1,825	629	3,027	24,639	6,557 2,525	4,732	22,970 6,210	1,669
Above four Sections	208,314	14,317	45,407	10,639	20,531	264,549	90,894		228,737	
Coconut	15,898	802	358	7 241	3,350	19,590	4,751		16,093	
Beverages, Food, Tobacco Engineering, Motors & Industrial	55,316	1.447	92,276	49,382	11,095	169,067	154,200	61,924	84,729	84,338
Finance and Land	1,516	29,919	9,597	7,387	7,002	49,085	53,905		16,466	
Hotels	5,320	24 351	189	928	6,942	74 393	8,321		73 393	
Miscellaneous	26,771	8,315	36,649	29,706	6,377	75,103	81,047		41,150	
Stores & Supplies	10,354	1,824	17,822	9,541	3,140	35,050	32,327		22,432	
Total	374,852	107,897	267,832	115,183	76,231	781,095	567,143	299,311	534,910	246,185
The particular of the special particular and the	THE RESERVE THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS	The state of the s				The state of the s				

SELECTED RATIOS

	The same of the same of											-
Section of Share List	No. of Co's	Return on Capital %	Return on sales %	Sales to Net Assets	Sales to Fixed Assets	Sales to Curr't Assets	Sales to Stocks	Sales to Debtors	Current ratio	Quick Assets ratio	Debt/ Equity ratio	Equity/ Fixed Assets ratio
		(77)	(67)	(+7)	(67)	(07)	(77)	(07)	(67)	(0c)	(10)	(35)
Tea	50	2.0	2.7	0.7	6.0	2.0	3.5	17.2	2.5	1.1	0.2	1.1
Tea-Cum-Rubber	19	2:3	4.2	9.0	0.7	1.8	4.2	15.9	2.9	1.7	0.1	1.1
Rubber	23	2.8	6.2	0.5	0.5	1.7	6.1	17.8	2.2	1.6	0.1	1.1
Rubber (Malay)	2	2.0	6.5	0.3	0.4	6.0	76.2	5.0	6.9	8.9	0.2	1.2
Above four Sections	76	2.1	3.3	9.0	8.0	1.9	3.8	16.2	2.6	1.3	0.2	1.1
Coconut	5	3.3							4.5	4.2	0.2	1.0
Beverages, food, Tobacco	9	7.2							3.2	1.4	0.5	1.8
Engineering, Motors & Industrial	16	5.6							000	5.	1.0	1.5
Finance and land	-	2.8							8.5	7.0	2.0	10.9
Hotels	S	0.7							5.6	5.1	0.1	2.1
Investment Trusts Miscellaneous	0 0	1.4							55.8	55.8	0	'
Stores & Supplies	7	4.6							4.2	1.9	9.0	2.2
Overall	150	4.1							3.5	1.9	0.5	1.4
			THE REAL PROPERTY OF THE PERSON NAMED IN	SCHOOL STREET, STREET, SQUARE,	TOTAL STREET, ST. THE STREET,	-	Annual Contractor of the last	DOTTON DESCRIPTION	ACTOR VALUE CONTINUES AND ADDRESS OF	SECURITIES AND DESCRIPTION TO SECURITIES AND DESCRIPTION OF THE PERSON O	STATE OF STREET STATE OF STREET	THE REAL PROPERTY AND ADDRESS OF THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NA

Source: Handbook of Rupee Companies, 1968, issued by the Colombo Brokers' Association.

Definitions:

- Col. 3 Net profit or loss is taken from the latest Profit and Loss account shown. It is net of taxation (since taxation is often combined with furlough), and before appropriations, i.e. balance from working account, sundry income, management and sundries, depreciation, taxation and furlough, bonus, replanting expenditure charged to P/L account, and replanting subsidy are taken into the net profit or loss, but not adjustments for previous years, transfers to reserves, or dividends.
- Col. 4 Sales are calculated from published data on production and net sale average prices. This is available only for tea and rubber companies.
- Col. 7 Free reserves are expended and unexpended reserves, less any debit balance on P/L account and fictitious assets.
- Col. 8 Debentures includes D.F.C.C. loans.
- Col. 10 Long term creditors are taxation and furlough reserves, provisions, minority interest and balance due from associated companies. Debentures and bank loans are shown separately.
- Col. 11 Short term creditors are sundry creditors, dividend and tax creditors.
- Col. 12 Fixed assets include goodwill.
- Col. 13 Investments include balances due from associated companies, and tax reserve certificates.
- Col. 14 Stocks include work-in-progress, goods in transit, unsold produce and (in finance companies) stocks out under hire purchase agreements.
- Col. 15 Debtors include deposits and payments in advance.
- Col. 17 Net assets equals all assets, less short term creditors (columns 12–16, minus 11).
- Col. 18 Current assets equals investments, stocks, debtors and cash (columns 13 16).
- Col. 19 Quick assets equals investments, debtors and cash (columns 13, 15 and 16).
- Col. 20 Equity equals ordinary shares, preference shares and free reserves (columns 5 7).
- Col. 21 Debt equals debentures, bank loan and long term creditors (columns 8 10).
- Col. 22 Return on capital % is net profit over net assets x 100 (column 3 ÷ column 17).

- Col. 23 Return on sales % is net profit over sales x 100 (column 3 ÷ column 4).
- Col. 24 Sales to net assets is column 4 ÷ column 17
- Col. 25 Sales to fixed assets is column 4 ÷ column 12
- Col. 26 Sales to current assets is column 4 ÷ column 18
- Col. 27 Sales to stock is column 4 ÷ column 14
- Col. 28 Sales to debtors is column 4 ÷ column 15
- Col. 29 Current ratio is column 18 ÷ column 11
- Col. 30 Quick assets ratio is column 19 ÷ column 11
- Col. 31 Debt/equity ratio is column 21 ÷ column 20
- Col. 32 Equity/fixed assets ratio is column 20 ÷ column 12.

TYPICAL EXAMINATION QUESTIONS

1. The following figures apply to a small manufacturing company:

	Rs.
Annual sales for previous year	230,000
Profit after tax for previous year	13,340
Budgeted annual sales for next year	242,000
Budgeted profit after tax for next year	14,278

In the first of the two years the average total assets amounted to Rs. 200,000, and are estimated to amount to Rs. 220,000 for next year.

Assuming full budget realisation, and taking turnover into account, what alteration in the ratio representing return on capital employed will take place, and what are the reasons?

(ICWA IV 12/65)

	Profit/ Net Assets	Profit/ Sales	Sales/ Net Assets	Fixed Assets/ Total Assets	Sales/ Net Worth
Mul stanger!	%	%	Times	%	Times
Company A	13.3	8.3	1.6	52.0	2.1
Average of other companies in same industry	17.4	11.6	1.5	60.0	2.1

The above information which has been prepared from the published accounts of companies has led your managing director to conclude that other companies are obviously much more efficient than Company A. Comment on the figures disclosed above giving a brief description of the significance of each figure in the table and discuss the dangers which might exist in basing an opinion on figures which have been arrived at from the published accounts of companies.

(ACCA 6/67)

- 3. Devise a pyramid of ratios specifically for a firm running a fleet of trawlers, and having cold store facilities.
- 4. The following are the Balance Sheet & Profit and Loss of Ratios (Ceylon) Ltd.

Balance Sheet as at 30th September 1968

Authorised share	Rs.	Rs.	Fixed Assets:	Rs.	Rs.
capital: 15,000 6% Preference shares of Rs. 10/- each	150,000		Land, buildings and equipment	300,000	
5,000 Ordinary shares of Rs. 10/– each	50,000		Less: Accumula- ted depreciation	210,000	90,000
	200,000				
Issued share capital: 5,000 6% Preference shares 2,000 Ordinary shares	50,000	70,000	Other Assets: Trade Investmen Patents Goodwill Research and development cost	10,000 15,000	50,000
Capital reserve: Share premium		30,000	Current Assets: Stock in trade	120,000	
Revenue reserves: General reserve Accumulated profits	60,000 90,000	150,000	Prepaid expense Debtors Marketable in- vestments (Market value Rs. 2700)	60,000	
			Cash		230,000
Taxation equalisa- tion reserve		20,000			
Long term liabilities: Mortgage loan		30,000			
Current liabilities: Trade creditors Accrued expenses Current tax lia-					
bility Deferred income received	20,000 4,000	70,000			
		370,000	milet sale and to		370,000

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Profit and Loss Account for Year ended 30th September 1968

			Rs.
Net Sales			750,000
Cost of Sales	Sh		520,000
			230,000
Operating expenses			160,000
			70,000
Non-operating expenses			19,000
(Including interest paid on long te	rm liabilit	ies duri	ing
the year - Rs. 2000)		••	51,000
Taxation		*	20,000
Net Profit after taxation		Mist.	31,000

Calculate and present:

- (a) Two ratios appraising liquidity
- (b) Two ratios appraising management of funds
- (c) Two ratios appraising profitability related to assets
- (d) Two ratios appraising profitability related to turnover.

(DPFM II 12/68)

5. You are the secretary of a trade association which looks after the general interests of its member firms. Some of these firms feel that it would be useful if a scheme of interfirm comparison could be introduced within the association. You are required, therefore, to draft a circular pointing out the advantages and limitations of such a scheme and the type of information which could be produced. After such a scheme has been introduced it is found that in a given year certain of company Y's costs compare with the average costs provided by the Association as follows:-

Costs per unit of product (Rs.)

Average for all

	firms	Company Y
Direct labour	15	10
Direct material	 32	30
Overhead	16	26

Give possible explanations of these differences and indicate what investigations it might pay Company Y to make.

6. On 1st January, 1952, Jo Perera purchased a small retail grocer's shop which he has operated since with no assistance other than that of his wife. In 1963 he joined with a number of other small grocers as members of the "Small Grocers' Federation", a non-profit making association designed to help the small retailer improve his efficiency in face of growing competition from other outlets. The association decided that it would be worthwhile to present annual trading figures of the members constructed on a like basis and to this end Mr. Perera submitted his accounts for the year ended 31st December, 1964 as follows:

Jo Perera (Grocer)

Profit and Loss Account for the Year ended 31st December, 1964.

		Rs.	Rs.
Sales			64,620
Less Cost of Sales			38,770
Gross Profit			25,850
Expenses			
Rates	13000	800	
Wages (as allowed by Inland Revenue	for		
his wife)		2,080	
Advertising, Printing and Stationery		3,260	
Lighting & Cleaning		2,360	
Insurances		500	
Depreciation	20.	2,500	
Telephone		510	
Miscellaneous expenses		1,270	
			13,280
Net Profit before Taxation	dy faire.		12,570

Mr. Perera also had to supply the following additional information:

- (i) His capital account at 1st January, 1964, was Rs. 30,000.
- (ii) No rent is payable as the premises are owned.
- (iii) A schedule of the time spent by his wife and himself in the business which was 20 hours and 50 hours per week respectively.
- (iv) The original cost, date of purchase and life of equipment.

 Subsequently, Mr. Perera received a statement of his own figures for comparison with the "average" for the association as a whole.

		Mr. P	erera	Associ	rage iation nber
C 1		Rs.	Rs.	Rs.	Rs.
Sales			64,620		79,260 41,210
Less: Cost of Sales	• •		38,770		41,210
Gross Profit			25,850		38,050
Expenses					
Management Salary		15,600		11,700	
Wages		3,600		3,900	
Rates		800		750	
Advertising, Printing and					
Stationery		3,260		1,800	
Lighting & Cleaning		2,360		2,190	
Insurances		500	THE REAL PROPERTY.	550	
Depreciation of equipmen	t	2,500		2,500	
Telephone		510		400	
Miscellaneous expenses		1,270		1,180	
Interest on Capital		1,800		1,820	
Rent of Premises		3,120		3,120	
			35,320		29,910
Net Profit/Loss before Tax		(loss)	9,470		8,140

Mr. Perera is most confused by the figures which show a loss of Rs. 9,470, particularly as he had been more than satisfied with his profit of Rs. 12,570, which was much more than he could earn outside. You are required:

- (i) To prepare a report, in non-technical language, explaining the differences, in so far as information is available, between his original profit statement and the amended one prepared by the association. Your report should indicate the reasons for the inclusion of "notional" or "imputed" cost items and whether you consider this to be beneficial from a management viewpoint.
- (ii) Comment on Mr. Perera's actual achievement relative to the trade as a whole suggesting possible areas of investigation.

(Adapted from ACCA 6/66)

- 7. List five ratios you would calculate in making an examination of a balance sheet. What would be your criteria for evaluating them?
 (DPFM II 1/68)
- 8. Manufacturers Ltd. have approached your company for an extension of credit terms. The following information from the last three annual financial statements of Manufacturers Ltd. has been extracted for you.

(1)	Financial Position-As at 3	0th June	1967 Rs.	1968 Rs. (000's)	1969 Rs. (000's)
	C 111		(000's) 250	250	250
	Goodwill Fixed Assets-(Other than	• •	 805	865	920
	Goodwill)		700	000	820
	Stock		 700	900 640	784
	Debtors		 605	040	707
	Cash in Hand and at Bar	nk	 		
			2,420	2,655	2,774
	and D. C Share Co.	nital	500	500	500
	8% Preference Share Capital	pitai	750	750	750
	Ordinary Share Capital Reserves and Surplus		 450	463	458
	Future Taxation		 60	62	50
	Current Liabilities	189(4)	 660	880	1,016
			2,420	2,655	2,774
			1967	1968	1969
			Rs.	Rs.	Rs.
			(000's)	(000's)	(000's)
(0)	Not Color		3,500	3,800	4,300
(2)	Net Sales Gross Profit		700	370	750
(4)	C. (AC: T)		 150	150	150
(7	1100110110 (121111 2111)				required

As Management Accountant of your company you are required to frame a brief memorandum to your Managing Director commenting on the working capital, stock, debtors, fixed assets and proprietorship positions of Manufacturers Ltd. and giving your recommendations. (ICAC Final 12/69)

9. Effectiveness in the use of production resources is often demonstrated by standard costing "ratios". Define four such ratios using the following example to illustrate your answer:

The standard working conditions in a Company are 8 hours per day and $5\frac{1}{2}$ days per week. In a four week period where there was a special one day holiday a department whose maximum capacity is 55 employees had 44 actually working.

Budgeted hours per four weeks Actual hours worked during the four week period Maximum standard hours that can be worked per	7,744 7,100 9,680
four weeks Standard hours earned during the four week period (DPFM II	6,670 12/68)

10. A holding company has decided to apply return on capital employed in assessing the performance of its Subsidiary Companies. However, to obtain realistic figures, certain adjustments, based on price level indices to book values, will have to be made.

From information relating to the subsidiary companies, A and B, you are required firstly to calculate:

- (i) the current replacement cost of the asset involved;
- (ii) the accumulated depreciation to date, assuming the asset is to be reported at current value;
- (iii) the depreciation figure for the present year based on current values.

Secondly, using the calculated figures, you are required to state, with reasons, why you do/do not feel that in assessing capital employed, assets should be valued at current rather than historic cost.

	Subsidiary	Subsidiary
	Co. A Asset	Co. B Asset
Year of Purchase	1940	1950
	Rs.	Rs.
Purchase Price	200,000	550,000
Life	40 years	40 years
Disposable Value	Nil	Nil
Price level index at date of		100
Acquisition	40	
Price Level Index Now (1968)	150	150
Depreciation Method	Straight Line	Straight Line
		(ACCA 6/66)

11. You are advising a cheese wholesaler who sells four main products through a large number of depots. The accounting system is weak and the directors have in the past had little reliable information about depot profitability. You have assembled the data available for the last financial year about depot profitability for all depots which reveal a wide disparity in depot results. This data for three good, in terms of profitability, and three bad depots, together with other information which you have obtained, is set out below:—

(1) Comparative table of depot profitability for the year ended 31st December 1967-

Depot Sales in cwt	A 58.5	B 22.6	C 18.0	D 46.6	E 37.9	F 52.7
Sales value	681.2	272.1		000's) 540.7	456.5	594.9
Gross margin on sales	29.0	11.7	9.2	24.2	19.6	25.0
Operating expenses Transport costs	15.8 9.6	12.9	8.4 2.5	21.3	9.1 1.4	12.2 10.2
Charges for transport recovered (where shown separately						
on sales invoices)	(9.6)	(3.1)	_	(0.8)	(1.4)	(10.2)
Total costs (net of transport recoveries)	15.8	13.5	10.9	29.0	9.1	12.2
Profit/(Loss)	13.2	(1.8)	(1.7)	(4.8)	10.5	12.8

- (2) Sales are effected from depots by representatives to retail shops, hotels, restaurants and other large and small outlets. It is a weekly trade and representatives are notified each week the minimum prices at which they can sell large orders of each product. Due to varying local market conditions, varying sizes of sales orders and the infrequency of some orders, representatives have opportunities to obtain better than minimum prices and are expected so to do. Delivery charges are made for use of transport delivering from depots to customers either separately or in the selling prices charged; these charges are standard according to the vehicle used and the size of order. No discounts are given. Sales invoices are issued weekly.
- (3) Because of the large number of depots, the Company has been unable as a routine to account in the costing and financial books for the movement of stocks into and out of depots. For this reason, supplies are charged to depots according to the sales of each week at prices which are designed to give depots a standard gross margin for all products on the minimum selling prices set.
- (4) Each depot is the responsibility of a manager and its operations include selling by representatives, operation of the depot store, operation of a local transport fleet and an accounting and general office.

You are required to :-

- (a) specify, using the data given in the table, four indices or ratios which you would use to rank the performance of the six depots,
- (b) suggest four reasons for the seeming failure fully to recover transport costs in all cases,
- (c) specify three sales factors which you would consider critical in terms of weekly control of depot profitability by top management, giving your reasons.

(ICA FINAL 5/68)

12. Your company has decided to extend its productive capacity by building a new factory block. Various contractors have submitted tenders for this and the three most competitive are as follows:-

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	Tender Price		Estimated
		Rs.	completion time
Construction Company	A	675,000	24 months
Construction Company		645,000	28 months
Construction Company		695,000	24 months

Your managing director has asked you to analyse the most recent published accounts of these companies with a view to extracting any information which may assist him in deciding which contractor should be awarded the contract.

Summary Profit and Loss Accounts for year ended......

	Construc- tion Company A	Construc- tion Company B	Construc- tion Company C
	Rs.	Rs.	Rs.
Turnover	 1,250,000	850,000	2,000,000
Profit before Tax	 30,000	22,000	40,000
Dividend (Gross)	 15,000	Nil	25,000
Depreciation	 39,750	21,500	72,250

Summary Balance Sheets as at...... Fixed Assets

on Company C Depreciation	Rs. 325,000 42,000 20,000 387,000	351,150	738,150
Construction Company B Construction Company C Cost Depreciation Cost Depreciation			
Construc	Rs. 500,000 50,000 40,000	7,900 67,500 65,750 210,000	
n Company B Depreciation	Rs. 30,000 15,000 10,000 55,000	238,650	293,650
tion Com Depre	Rs. 80,000 5,000 5,000		
Construct	Rs. 110,000 20,000 15,000	6,500 48,400 15,750 168,000	
	Rs. 210,000 30,000 10,000 250,000	178,750	428,750
on Company A Depreciation	Rs. 50,000 5,000 15,000		
Construction Company A Cost Depreciation	Rs. 260,000 35,000 25,000	8,750 27,200 20,800 122,000	
		::::	
	:::	::::	
rixed Assets	Plant Land/Buildings Vehicles	Current Assets Cash Debtors Stock Work-in-Progress	
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(Adapted from ACCA IV 12/68)

Summary Balance Sheets as at..... Fixed Assets

Construction Company C Cost Depreciation	200,000	150,000 (7% Re- deema-	ble 10 yrs.) 100,000 15,000	26,000 15,000 82,500 149,650	273,150
Construction Company B Construction Company C Cost Depreciation Cost Depreciation	25,000	25,000 (7 % Re- deema-	ble 10 yrs.) 75,000 3,000	2,000	165,650
Construction Company A C	150,000	(6%Re- deema-	ble 2 yrs.) 25,000 10,000	15,000 9,000 70,450 99,300	193,750
Capital	Ordinary Re. 1/- Shares (Issued & Fully Paid)	Reserves Loan Stock	Taxation	Current Liabilities Taxation Dividends Creditors Bank Overdraft	

1

SUGGESTED ANSWERS

	Previous year			Next year
Return on capital employed	$\frac{13,340}{200,000} =$	6.67%	14,278 220,000	= 6.5%
Return on sales	$\frac{13,340}{230,000} =$	5.8%	$\frac{14,278}{242,000}$	= 5.9%
Turnover of net assets	$\frac{230,000}{200,000} =$	1.15	242,000 220,000	= 1.11

The reasons for the slight decline in profitability (6.67% to 6.5%) are:

- (i) a slower turnover of total assets (this should be analysed further) off set by
- (ii) a slightly higher profit margin on sales.

2. Profit/Net Assets

Company A makes only 13.3% compared with 17.4% in other firms. This big difference is evidence of inefficiency in Company A. However, the evidence is not conclusive.

- (i) If other companies value their net assets at historical cost less depreciation while Company A values them at their current value (which tends to be higher than written down cost especially after inflation), this could account for the difference.
- (ii) It is necessary to ensure that "profit" and "net assets" have been defined consistently for Company A and other companies.
- (iii) If Company A's assets include a large sum for goodwill this could also account for the difference. It is better to omit goodwill in computing this ratio.
- (iv) There may be special factors affecting Company A's profit this year, which were beyond the control of the directors, and should be allowed for before comparisons are made.

Profit/Sales

Company A has a much lower margin of profit than other companies. This explains the lower return on capital.

If selling prices are the same, the lower margin must be due to higher costs, or an unfavourable mix of products, e.g. Company A may be selling a higher proportion of low profit items than other companies.

Sales/Net Assets

Company A is better than others at generating sales with given assets, i.e. at using its assets intensively. However this is insufficient to offset the low profit margin,

Fixed Assets/Total Assets

Company A has only 52% of its total assets (fixed assets + current assets) invested in fixed assets, compared with 60% in other companies. This has two implications:

- (i) fixed assets usually generate more sales and profit than current assets. However, A with less fixed assets has managed to generate higher sales and profit than other companies;
- (ii) fixed assets are less liquid than current assets. Company A has proportionately more current assets than other companies, so is more liquid, and will find it easier to raise debt finance.

Sales/Net Worth

This is not a significant ratio in itself, but a comparison with sales/net assets indicates the ratio of net worth/net assets. This latter shows the proportion of net assets financed by the shareholders. In Company A net worth/net assets = 1.6/2.1 = 76%. In other companies it is only 1.5/2.1 = 71%, i.e. other companies get more of their finance from long term debt such as debentures, but the difference does not appear important in a Ceylon context.

4. (a) (i) Current ratio =
$$\frac{\text{current assets}}{\text{current liabilities}}$$
 = $\frac{230,000}{70,000}$ = 3.3

(ii) Quick assets =
$$\frac{\text{current assets (excl.stock)}}{\text{current liabilities}} = \frac{110,000}{70,000} = 1.6$$

(b) (i) Stock turnover =
$$\frac{\text{cost of sales}}{\text{average stock}} = \frac{520,000}{120,000*} = 4.3$$

* end-of-year stock is taken as a rough indication of average stock in the absence of further data.

(ii) Debtors turn-
over ratio =
$$\frac{\text{credit sales}}{\text{debtors}}$$
 = $\frac{750,000^*}{60,000}$ = 12.5

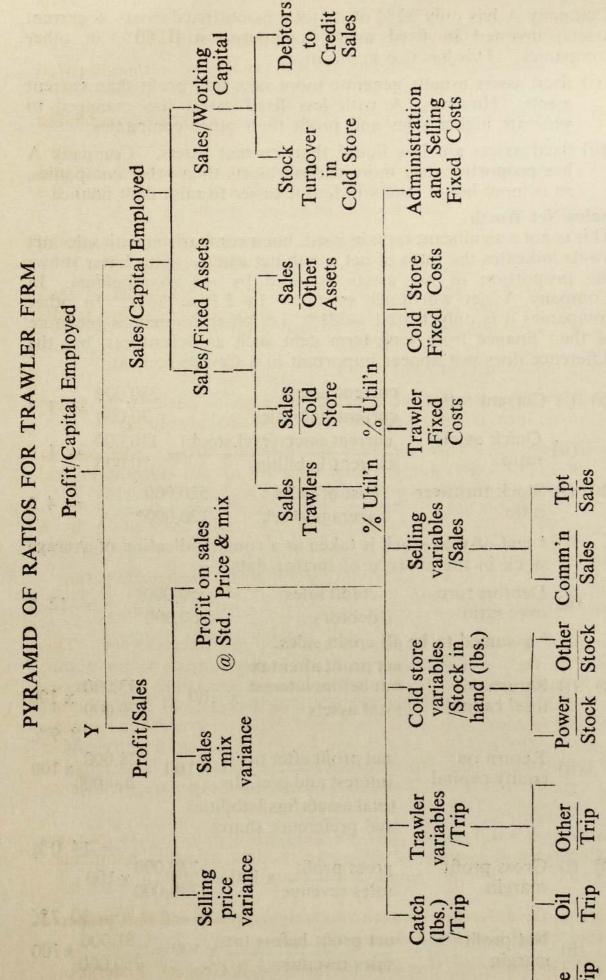
* assumed to be all credit sales.

(c) (i) Return on total capital =
$$\frac{\text{but before interest}}{\text{total assets}} \times 100 = \frac{33,000}{370,000} \times 100$$
$$= 8.9\%$$

(ii) Return on equity capital =
$$\frac{\text{net profit after tax}}{\text{interest and pref. div.}} \times 100 = \frac{28,000}{200,000} \times 100$$
total assets less liabilities and preference shares

(d) (i) Gross profit margin =
$$\frac{\text{gross profit}}{\text{sales revenue}} \times 100 = \frac{230,000}{750,000} \times 100$$

(ii) Net profit margin =
$$\frac{\text{net profit before tax}}{\text{sales revenue}} \times 100 = \frac{51,000}{750,000} \times 100$$
$$= 6.8\%$$



(It is assumed that, except for the cold store, stock of fish is small in relation to sales since it is highly perishable.)

5. To all member firms

Date

Proposed scheme of interfirm comparison (IFC)

The advantages of IFC schemes are well recognised in the industrial countries. Briefly, they are as follows:

- (i) IFC reveals to each firm its strengths and weaknesses compared with other firms;
- (ii) an IFC scheme promotes cost consciousness, improvement and standardisation of materials, methods and products and the elimination of waste and inefficiency;
- (iii) since an IFC scheme requires a uniform basis of costing, all firms get the advantages of a good costing system;
- (iv) the trade association guarantees confidential treatment of each firm's results; each firm gets back an analysis of its own results and a comparison with the average of all firms.

Limitations of IFC are as follows:

- (i) IFC depends upon all firms adopting and adhering to a system of uniform costing to ensure comparability of results;
- (ii) if firms are very different in their materials, methods or products, even though they may be in the same industrial category, the comparison may be less useful;
- (iii) accounts must be rendered to the trade association by a scheduled date.

A scheme of IFC would produce significant management ratio.

C See page: 500

Company Y's direct labour costs are $\frac{1}{3}$ rd lower than average. This could be due to lower wage rates or higher output per manhour, but is more likely to be due to higher mechanisation of processes performed by hand in other firms. This is borne out by the higher cost of overhead; this would include depreciation on the machinery. However, the total of labour and overhead is significantly higher for Company Y (Rs. 36) than the average (Rs. 31). This may be due to uneconomic mechanisation, unnecessary expenses, inefficiency or low volume. This should be investigated.

Company Y's direct material costs are slightly lower than average. If Company A is making the same product as other companies, this reflects good buying and/or low material wastage.

6. Report on the difference between your original profit and that prepared by the "Small Grocers' Federation"

(i) The statement prepared by the "Small Grocers' Federation" is based upon your profit and loss account for 1964, but includes

		Avera all fi	ge of irms		ur
		Last	This	Last	
1.	Profit before tax x 100 Assets employed x 100	Joan	Joan	jear	
2.	Profit before tax x 100 Sales				
3.	Sales Assets employed				
4.	Production cost of sales x 100 Sales				
5.	Cost of marketing & distb'n x 100 Sales				
6.	Cost of administration x 100 Sales				
7.	Sales (at cost) Average stocks (at cost)				
8.	Average of outstanding debts Average sales per day				

Secretary

"additional expenses" included for comparative purposes between yourself and other members of the Federation. These "additional expenses" have not actually been incurred by you, but because they have been included in the statement reduce your profit to a notional loss of Rs. 9,470. The "Small Grocers' Federation" statement is reconciled with your profit and loss account below.

		Rs.	Rs.	Rs. 9,470
Net loss before tax per statement Add: Expenses showing in statement	but			9,470
not incurred: Management salary		3 600	15,600	
Wages: Less: Wages in Profit & Loss A/c		3,600 2,080	1,520	
Interest on Capital Rent on Premises			1,800 3,120	22,040
Net Profit for 1964 before taxation, Profit and Loss Account	, per			12,570

It is because of the inclusion of expenses totalling Rs. 22,040, which you have not incurred, that your profit of Rs. 12,570 is reduced to a supposed loss of Rs. 9,470.

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When comparisons are made between businesses it is essential that the accounts be compiled on a like basis. If this is not done, any comparison made will be valueless. For this reason, the Federation has included the notional expenses of Rs. 22,040, so that your accounts will be comparable with other grocers.

These notional expenses have been included for the following reasons:

Management salary. – Certain members of the Federation will not be running their shop(s) on a day to day basis but will employ a manager. The profits of shops employing managers would be less than if the owner, as in your case, ran the shop. The statement therefore includes a notional sum of Rs. 15,600, which is an estimate of the amount you would have to pay a manager to work 50 hours a week to run your business.

Wages. – Your profit and loss account shows a sum of Rs. 2,080 allowed by the revenue in respect of 20 hours per week worked in the shop by your wife. The Federation estimate that if you employed an assistant to work in the shop for the same amount of time as your wife you would have to pay Rs. 3,600. The profit shown in your profit and loss account has therefore been reduced by a notional amount of Rs. 1,520 so that it is comparable with shops employing assistants.

Interest on Capital. – This item of Rs. 1,800 has been included in the statement to take into consideration the different amounts of capital invested in business by members of the Federation. Basically, the more capital invested in a business the greater profit you expect to earn. If your capital were invested outside the business you would expect to earn interest, and the more you invested the more interest you would expect to receive. Similarly, a member of the federation who has invested more capital than yourself would expect a greater return. For this reason, the statement includes interest on capital at 6% per annum, which represents the interest receivable on a safe investment outside the business. Thus interest on capital has been shown in the statement to take into account the differing amounts of capital invested by members in their businesses.

Rent of Premises. – The premises of the business are owned by yourself and no figure for rent is shown in the profit and loss account. A number of small grocers will not own their business premises and will pay rent. The statement therefore includes a notional figure for rent of Rs. 3,120, being an estimate of the amount you would have to pay if you did not own the premises.

Undoubtedly the inclusion of the above notional cost items is helpful from the managerial viewpoint.

Because the statement for the average association member is computed on the same basis as your own, comparisons can be drawn between your performance and that of the average member. If the statements were not prepared on a like basis, and the notional items were omitted, a fair comparison would not be possible. Comparison of actual performance with that of the average member will enable you to see where improvements could be made, in order to increase the profitability of the business.

Signed.	
	Accountant

(ii) Mr. Perera's achievement compared with the trade as a whole is poor. The average association member achieves a profit of Rs. 8,140, which is slightly over 10% as a percentage of sales, whilst in comparison Mr. Perera sustains a loss.

The main reasons for this are:

- (a) Gross profit as a percentage of sales is 40% for Mr. Perera compared with the average of 48% if Mr. Perera achieved the average percentage, his gross profit would increase by Rs. 5,170 to Rs. 31,020.
- (b) Inspite of his lower turnover, the management salary for Mr. Perera is Rs. 3,900 more than the average. This would appear to indicate that Mr. Perera's time is not as profitably applied as the time of the average member.

(c) Advertising, printing and stationery expenses are Rs. 1,460 greater than the average. As a percentage of sales this expense is 5% compared with the average of just over 2%. This expenditure is nearly double that of the average, and cannot be justified in the light of the results for the year.

In order to improve his position Mr. Perera should investigate the following:

- (a) The possibility of reducing the cost of sales. The statement suggests that the average association member obtains his supplies at a considerably lower price than Mr. Perera who should therefore consider alternative sources of supply. If Mr. Perera had achieved the average percentage gross profit of 48% his actual profit before taxation would have increased by Rs. 5,170 to Rs. 17,740.
- (b) Mr. Perera should review the manner in which he works to see if his time can be more profitably applied.
- (c) A critical review of advertising, printing and stationery expenditure should take place to ensure that non-essential expenditure is not incurred.
- (d) Other expenses of the business, such as lighting & cleaning telephone and miscellaneous expenses should be reviewed to see if savings can be made.
- 7. Balance Sheet ratios include the following:
 - (i) Current ratio. This should be at least 1.5 or 2 to 1, but the composition of the current assets is also important.
 - (ii) Quick assets ratio. This should be at least 1 to 1 as an indication that the organisation can pay its short term creditors from short term or quick assets.
 - (iii) Debt/equity ratio. A commonly accepted norm is 1 to 1, but considerably higher levels of gearing are possible if profits are stable. A lower level of gearing indicates inefficiency in obtaining funds from the cheaper sources.
 - (iv) Fixed assets to current assets ratio. There is no norm or standard value of this ratio for all firms since it depends on the nature of the business. However within a business, an increase in the ratio from one year to the next may indicate under-utilisation of fixed assets: a decrease may indicate a dangerous pile-up of stocks or debtors.
 - (v) Fixed assets to net worth ratio. This ratio should be rather less than 1 to 1 unless there is long term debt. In other words, long term assets should be financed entirely from long term capital.

8. Managing Director

Date

Credit to Manufacturers Ltd.

The company is in a very illiquid position and is also faced with a declining profit margin. Extending further credit would only worsen the position. I recommend that we do not accept any further orders on account, though orders for cash may of course be taken.

If Manufacturers Ltd. can fund their mounting current liabilities, i.e. pay them off from the proceeds of a share or debenture issue, we could then safely resume supplies on normal credit terms.

Significant ratios are as follows:

	1967	1968	1969
Current ratio	2.1	1.75	1.5
Quick assets ratio	 1.0	0.7	0.7
Return on total assets (after tax)	 6.2%	5.8%	5.4%
Gross profit margin	 20%	19.2%	17.4%
Turnover of total assets	 1.44	1.43	1.55
Rate of stock turnover	 4.0	3.3	4.3
Rate of debtors turnover	 5.8	5.9	5.5

Management Accountant

9. Efficiency ratio =
$$\frac{\text{standard hours of production}}{\text{actual hours worked}} = \frac{6670}{7100} = 94$$

Actual usage of budgeted capacity ratio = $\frac{\text{actual hours}}{\text{budgeted hours}} = \frac{7100}{7744} = 92\%$

Actual capacity usage ratio = $\frac{\text{actual hours}}{\text{maximum possible hours}} = \frac{7100}{9680} = 73 \%$

Activity ratio =
$$\frac{\text{standard hours of production}}{\text{budgeted standard hours}} = \frac{6670}{7744} = 86\%$$

The efficiency ratio reflects the productivity of labour compared with standard productivity. It can be seen that in 7100 hours, the output was only 6670 standard hours. This 6% fall from standard should be investigated.

The actual usage of budgeted capacity ratio reflects the over – or under – working compared with budget expectation. It can be seen that the budget allowed for only 44 working, but assumed that they would all work a 176 hour 4 week – period (44 x 176 = 7,744). The 8% fall is due partly to the special one day holiday; the rest must be due to absenteeism, idle time, etc.

Actual capacity usage ratio takes into account not only the fall off from budget, but also the difference between budget and the maximum possible. This shows that overall capacity is 27% under – utilised.

The activity ratio combines the efficiency ratio and the actual usage of budgeted capacity ratio $(94\% \times 92\% = 86\%)$.

10. (i) Current replacement cost $200,000 \times \frac{150}{40} = 550,000 \times \frac{150}{100}$ $= \text{purchase price } \times \frac{\text{PL index now}}{\text{PL index at acquisition}} = \text{Rs. } \frac{750,000}{100} = \text{Rs. } \frac{825,000}{100}$

(ii) Accumulated depreciation to 1968 (based on above current values)

$$= \frac{\text{age of asset}}{\text{life}} \times \frac{\text{current value}}{\text{minus disposable}} = \frac{28}{40} \times 750,000 = \frac{18}{40} \times 825,000$$

$$= \text{Rs. } 525,000 = \text{Rs. } 371,250$$

(iii) Depreciation for present year (based on above current value)

$$= \frac{1}{\text{life}} \times \text{current value minus disposable value} = \frac{750,000}{40} = \frac{825,000}{40}$$

$$= \text{Rs. } 18,750 = \text{Rs. } 20,625$$

N. B. The Institute of Chartered Accountants recommend that the only depreciation charged in the Profit and Loss account should be based on historical cost (i.e. Co. A could charge $\frac{200,000}{40} = 5,000$)

and that the balance (18,750,-5,000 = 13,750) be appropriated out of profits to a Reserve for Increased Costs of Replacement.

In assessing capital employed for comparative purposes, it is better to inflate all assets to their current values so that like can be compared with like. It is evident from the above, that the two companies have about the same amount of assets (750,000 and 825,000). Company A's asset has a far lower cost only because it was purchased when prices were far lower.

If a price level index is available for all the years in which assets are purchased and for the current year, the correction to asset value is easily made.

Secondly, profits are at current values. Profit on assets is more significant if assets are also taken at current values.

- 11. (a) Ratios for ranking performance are as follows:
 - (i) in the short term, profitability is measured by contribution per unit of limiting factor. Assumming sales value to be the limiting factor, and contribution to be equal to (gross margin + charges for transport recovered transport costs) we have:

(Rs. 000)	A	В	C	D	E	F
Cont'bn	29.0	11.1	6.7	16.5	19.6	25.0
Sales value	681.2	272.1	214.5	540.7	456.5	594.9
P/V ratio						
(Cont'bn per						
(rupee of sales)	4.3%	4.1%	3.1%	3.1%	4.3%	4.2%

(ii) long term profitability is best judged by net profit on capital employed. Data on capital employed is not available, but if we assume that capital employed is in proportion to sales value, we can rank on net profit margin on sales, as follows:

Rs. 000	A	В	C	D	E	F
Net profit	13.2	-1.8	-1.7	-4.8	10.5	12.8
Sales	681.2	272.1	214.5	540.7	456.5	594.9
Net profit/sales	1.9%	-0.7%	-0.8%	-0.9%	2.3%	2.2%

(iii) efficiency in operation may be judged from the ratio of operating expenses per cwt:

(Rs. 000)	A	В	C	D	E	F
Operating expenses Cwt. sold	15.8 58.5	12.9 22.6	8.4 18.0	21.3	9.1 37.9	12.2 52.7
Operating expenses (Rs.) cwt.		572	466	457	240	232

(iv) efficiency in distribution may be judged from the ratio of transport costs per cwt:

	A	В	C	D	E	F
Transport costs (Rs. 000	9.6	3.7	2.5	8.5	1.4	10.2
Cwt. sold	58.5	22.6	18.0	46.6	37.9	52.7
Transport costs/cwt.						
(Rs.)	164	164	139	182	37	194

- (b) The seeming failure fully to recover transport costs in all cases may be due to the following reasons:
 - (i) transport costs are sometimes included in the selling price, and not invoiced separately.
 - (ii) recoveries are made at standard rates irrespective of actual costs; the standard rates take into account the vehicle used and size of order, but not the distance travelled, the product, time of delivery (whether in normal time or overtime), normal or express delivery, etc. all of which would affect actual costs.
 - (iii) the standard charges may be incorrect or out of date with regard to basic costs, the mix of products, the volume of sales, level of lorry utilisation, etc.

- (iv) there may be no effective procedure for ensuring that transport charges are duly invoiced (especially as some charges are included in the price and some are not).
- (c) Sales factors that are critical for control are as follows:
 - (i) separation of delivery charges from basic selling prices.
 - (ii) volume of sales should be measured in revenue terms if depot representatives are to retain flexibility in negotiating prices above prescribed minima.
 - (iii) the mix of products is important if their P/V ratios are materially different.
- 12. Comparison of construction companies A, B & C from the point of view of assessing ability to carry out a contract within the required terms.

(i) Working capital position

The company that gets the contract will need additional work in progress to cover the period from incurring costs to their recovery on progress payments by us. The ability to raise short term finance for this depends on the ratio of current assets to current liabilities. Companies B and C may be able to get further overdraft facilities, but Company A appears already overdrawn up to the hilt (current ratio 0.9) and may be risking insolvency in the near future. Also Company A has to redeem loan stock in 2 years (i.e. within the contract period) and may not be able to do so.

(ii) Efficiency

The net profit on capital employed reflects not only the company's efficiency in keeping costs down, but also its efficiency in getting high contract prices (at our expense). Similarly net profit on sales. A better indicator is the sales to net assets ratio, which reflects the efficiency with which assets are managed and utilised to generate sales.

A $1,250,000 \div 235,000 = 5.3$ times B $850,000 \div 128,000 = 6.6$, C $2,000,000 \div 465,000 = 4.3$,

(iii) Resources available

The Balance Sheet is not a very reliable guide as to the availability of plant, land, buildings, vehicles etc. which may be required for the contract as a good deal of plant etc. may be hired. The Balance Sheet shows only owned assets in aggregate without details of their capacity, condition, etc. A very crude indicator of quantity is the total cost; B has much less equipment than A or C. Also B's assets are much more heavily written down: this could mean that they are older.

There is no way of judging managerial resources from the accounts. This is probably far more important to the successful completion of the contract.

The size of the contract in relation to the turnover indicates its relative importance to the contractor, and the proportion of time and attention their managers are likely to devote to it. This favours B, the smaller company, but on the other hand B may not have the degree of specialisation of larger companies.

Management Accountant

SECTION VIII

ACCOUNTING SYSTEMS

8.1 DEFINITION

An accounting system is an organised arrangement of paperwork, personnel, and office equipment which, by certain procedures, produces information out of raw data.

The basic procedures are:

- (i) sales debtors and receipts (see section 8.18)
- (ii) purchases creditors and payments (see section 8.19)
- (iii) timekeeping and payroll (see section 8.20).
- (iv) costing and stores accounting (see section 8.21).
- (v) books of account and financial statements (see section 8.22)

An accounting system provides a complete record of the transactions of a business. This includes both *external* transactions such as sales orders, cash receipts, purchase orders, goods receipts and cash payments and *internal* transactions such as use of materials, depreciation of assets, and transfers between different accounting units in the same firm.

8.2 PURPOSE OF ACCOUNTING SYSTEM

The primary purpose of this record is to provide *information*. On the basis of this information managers can plan and control the operations of the business.

In a small firm, the proprietor may feel that the main purpose of keeping accounts is to satisfy the requirements of the Inland Revenue. Similarly, in a small limited company, the main pressure may come from the auditor, who enforces the requirements of the Companies, Ordinance. However, in a larger firm, it is not possible for the manager or proprietor to control the business solely by personal contact; he needs accounting reports to tell him how the business is really doing, and what action needs to be taken. In fact, the accounting system is part of the management information system and should be viewed as a system for providing relevant information to decision-makers at all levels, and reporting the results of decisions ("feed-back").

8.3 COST AND VALUE OF SYSTEM

A good accounting system provides reliable, relevant and timely information to the right people at the lowest possible overall cost. Systems should never be designed to provide information, or for additional control, "at all costs". The value of information, or of additional control, must always be compared with the cost of providing it. The cost of a system comprises—

- (i) the salaries and overheads of all accounting personnel
- (ii) a proportion of the salaries and overheads of non-accounting personnel who fill in forms and other primary records
- (iii) a proportion of the salaries and overheads of managers at all levels who have to read and interpret accounting reports
- (iv) cost of stationery used
- (v) depreciation, power and maintenance of office equipment used, and salaries and overheads of machine operators.

The value of information depends entirely on what is done with it. If a cost report draws attention to a budget overrun, and action is taken resulting in a cost reduction, the value of the report is the costs saved (extra profit). It is not always easy to determine the precise profit value of information, but it is usually possible to determine the cost, then consider whether the value is likely to be more or less than the cost.

8.4 SYSTEM DEPENDS ON THE BUSINESS

There is no one accounting system which is ideal for all businesses. The system must be tailored to the individual firm, since each firm has its own type and volume of business, and information needs. Firms differ also in their organisation structure, and in the personal characteristics of their managers and clerical staff (though these should where possible be changed to suit the system rather than the other way about).

8.5 CONSIDERATIONS IN SYSTEM DESIGN

The design of accounting systems is specialised work. If a firm does not have an O & M specialist, it can consult a management consultancy firm or an accounting firm which provides such a service. Also it can draw on the expertise of business equipment firms. Their advice, though it is free, will inevitably be biased in favour of their own equipment.

Frequently an O & M assignment is made because accounts are in arrears, or control is being lost, or excessive overtime is being worked.

In this book we cannot go into detail on the stages of an O & M assignment, methods of recording and flowcharting procedures, or the design, implementation, testing and maintenance of new systems. Reference should be made to a standard textbook (such as Work Study by R. M. Currie (Pitman))

We are concerned here with the role of the management accountant, who will frequently be asked his views on how to instal or improve accounting systems, or to overcome bottlenecks or arrears of work. For this purpose he must have at least a general appreciation of the requirements and benefits of O & M work.

In setting O & M assignments, and in considering recommended systems, the management accountant should bear the following points in mind:

(i) the "ideal" system would be based, not on the forms or equipment at present in use, nor the present organisation structure or division of duties, or authority and status of different personnel, but on the information needed to plan and control the activities of the firm and so achieve its objectives. It will be appreciated that changes in organisation will often be strongly resisted by those who feel that they are losing thereby, even though changes are in the best interest of the firm. Similarly proposals to acquire new expensive equipment may be turned down. Therefore, the systems analyst should be given clear terms of reference and understand, before he starts, what solutions are likely to be acceptable, and how much support he will have in their implementation.

Many assignments, of course, will be limited to a single procedure, or part of a procedure, in which there are unlikely to be changes in the organisation structure. Only a senior systems analyst could properly advise on organisation. Nevertheless, problems have a habit of being interrelated, so the systems analyst must remain constantly aware of the boundaries of the problem to which he is currently assigned, and the constraints on the solution;

- (ii) a system should be flexible, that is, it should remain operable despite absence of staff on leave, illness, strikes or for any other reason, breakdown of equipment, fluctuations in the volume of work, or minor changes in the input or output required. It should also allow for foreseeable expansion in the future;
- (iii) it should not be assumed that a mechanised system is bound to be more efficient than a manual system; often the reverse is true. (See section 8.25);
- (iv) the new system must provide for internal control and check. To some extent this may conflict with the goal of simplification and minimum cost; nevertheless internal control is essential. It is wise to get the internal and external auditors to approve the new system before any implementation.

8.6 CLASSIFICATION

The framework of any accounting system is the classification of transactions into accounts. Each transaction has two aspects, debit and credit, each of which must be classified to an account. For instance, a cheque payment may be debited to any one of a number of different accounts; the credit to Cash account may be called self – classifying since all cheque payments are credits to Cash.

Obviously there must be an account or "pigeonhole" for each aspect of every transaction. It is equally important that the same items are always posted to the same account; the classification must not vary from one clerk to another, or from one year to the next, or the total of the account will not be meaningful. Therefore, each account should be defined in advance, as to what it contains and what it does not contain.

How many accounts should be opened? Should there, for instance, be separate accounts for printing and stationery? There cannot be any fixed answer to this, since it depends on the information needs of management, balanced against the cost of additional information. In some circumstances it may be desirable to know the cost of printing separately from the cost of stationery so that they can be separately controlled; on the other hand an additional account requires additional work in the analysis and posting of payments, and totalling and balancing the account. As a general rule the accounts should be specified from a consideration of the regular reports and information required; if additional information is occasionally required this should be obtained by ad hoc analysis. (In the above example, a single account would be kept for Printing and Stationery with references or short details on the account so that further analyses could be made as required).

8.7 SYSTEMS OF CLASSIFICATION

Costs may be classified in different ways. The most familiar is a classification according to their nature, such as salaries, wages, overtime, purchases, telephone, rent, tax, etc. This may be thought of as a classification according to input; we put in payments for time worked, materials, and outside services and get out so much of product X, so much of product Y, and so on. The classification of costs by output is in effect the aim of cost accounting, which arrives at the cost of each separate product. However, it is not possible in most cases to take costs at the time of payment and classify them directly to the final product. are a number of intermediate stages before a cost can be attached to a product. The cost accountant uses the concept of a cost centre, as an intermediate storage for costs before they are finally attributed to products and set against the appropriate revenue. For instance, each functional department, (e.g. sales, accounting, engineering) may be a cost centre. In a large firm, there is a considerable breakdown into cost centres. This provided the second system of classification - according to the function or purpose of expenditure, e.g. the cost centre which gets the benefit. (This is sometimes called an "objective" classification, and the natural classification is called "subjective". However these terms are not standard, and in government expenditure classification are usually reversed).

In a purely natural classification, salaries, for instance, are shown in a single account. In a functional system, salaries are divided over production, selling, and administration cost centres according to the respective times and salary rates of personnel working for those cost centres.

In most large firms using cost accounting, costs are classified both by their nature and by function or cost centre. This is a two – dimensional classification; there is a natural account for every cost item, and there is also a cost centre for every cost item. In most small firms not using cost accounting, costs are classified on a mixed system. For instance, a typical set of accounts includes not only natural accounts such as salaries, telephone, etc. but also functional accounts such as repairs, maintenance, canteen, and selling expenses. If salaries are spent on repairs they are charged not to salaries, but to repairs. If purchases are made for the canteen, they are charged not to purchases but to canteen. The difficulty with a mixed system is that all the exceptions to a purely natural classification must be thought out and defined in advance, e.g. trade calendars should be charged to selling expenses, not to printing and stationery. See 'Appendix 1' for an example of a chart of accounts which allows, first, for a classification of costs by their nature, then for a second classification by cost centre.

Costs may also be classified as fixed or variable, direct or indirect (in relation to the cost centre to which they are charged), controllable or uncontrollable (by the person responsible for the cost centre to which they are charged), and as standard (normal) or variance (abnormal).

8.8 UNIFORM COSTING

Some industries in advanced countries have adopted uniform costing, i.e. all participating firms in an industry use the same account and cost classifications and definitions, so that firms may compare their operating results and take remedial action accordingly. Usually comparisons are made by a trade association or an independent body to preserve secrecy. The best-known and most widely used system of uniform costing was introduced in the U. K. printing industry in 1913.

Many attempts have been made to develop a uniform or standard system of classifying accounts for all firms, and all industries but without much success. Different types of business using different methods and processes, need different information. Even within the printing industry, firms are classified by type of activity, e.g. general printers, book printers, newspapers, and by size, before meaningful comparisons can be made.

An International Chart of Accounts was published in 1958 by a committee set up at the international accounting conference in Paris in 1951 (Le Plan Comptable International, Eds. Cambel, Brussels). This chart of accounts provides a very open framework in which the individual firm can develop its own cost and revenue classification. The chart shown in 'Appendix 1' is loosely based on the International Chart.

8.9 DIVISION OF ACCOUNTS INTO LEDGERS

Once the account classification has been worked out, and the contents of each account carefully defined, accounts are divided between ledgers. Usually a main ledger is opened and a separate ledger for the detail accounts supporting each control account.

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8.10 CONTROL ACCOUNTS

When a large number of accounts of the same type is required for management information and control, they may be extracted from the double entry system and replaced by a total or control account. A total account is an account to which are debited and credited in total all transactions which have been debited and credited in detail to the individual accounts. If the account is regularly reconciled and agreed with the detailed accounts it may properly be called a control account, since it then provides a control on the accuracy of posting to the detail accounts, and their totalling and balancing.

The most familiar example is a Debtors Control account which replaces in the Trial Balance all the individual sales ledger balances. Other examples are as follows:

Control account

Creditors control
Raw materials and consumable
stores control
Work in progress control
Finished goods control
Share capital
Plant
Investments
Bills receivable/payable
Loans to officers
Debentures
Cash at bank
Cash in hand

Detailed records

Bought ledger
Stores ledger
Job ledger
Finished goods ledger
Share ledgers
Plant register
Investment ledger
Bills receivable/payable
register
Loans ledger
Register of debenture holders
Receipts cash book(s) and
payments cash book(s)
Petty cash book(s)

The system advantages of control accounts are:

- (i) a large number of accounts can be subjected to overall arithmetical control, thus localising clerical errors;
- (ii) if the control account is maintained and reconciled with the detail accounts by an independent person, this provides an additional internal control on the clerk keeping the detail accounts;
- (iii) a Trail Balance and accounts can be quickly prepared without extracting detail balances.

The disadvantages are:

- (i) a control account, like a Trial Balance, does not reveal certain types of clerical error, viz. posting to the wrong account (within the same ledger), omission in both control account and detail account, and compensating errors;
- (ii) each additional control account requires a further analysis column in each of the books of prime entry affected. Too many columns makes books unwieldy, and adds more errors, defeating the purpose of the system.

As a rule of thumb, a control account may be opened in the General Ledger for as few as 20 accounts of the same type, e.g. finished goods. Where accounts are very numerous, e.g. raw materials and spare parts, they may be divided into classes so that each control account does not cover more than 500 to 1000 detail accounts. This aids error-finding. Sales ledgers are often divided by the initial letter of the customers name, e.g. A-K, L-Z.

8.11 INTEGRATED ACCOUNTING SYSTEMS

An integrated accounting system is one in which all transactions are processed once only, debit and credit in a single double entry system, and there is only one Profit and Loss account. A non-integrated system is one in which transactions are processed first for one set of records, then for another set of records, so that the two sets have to be reconciled.

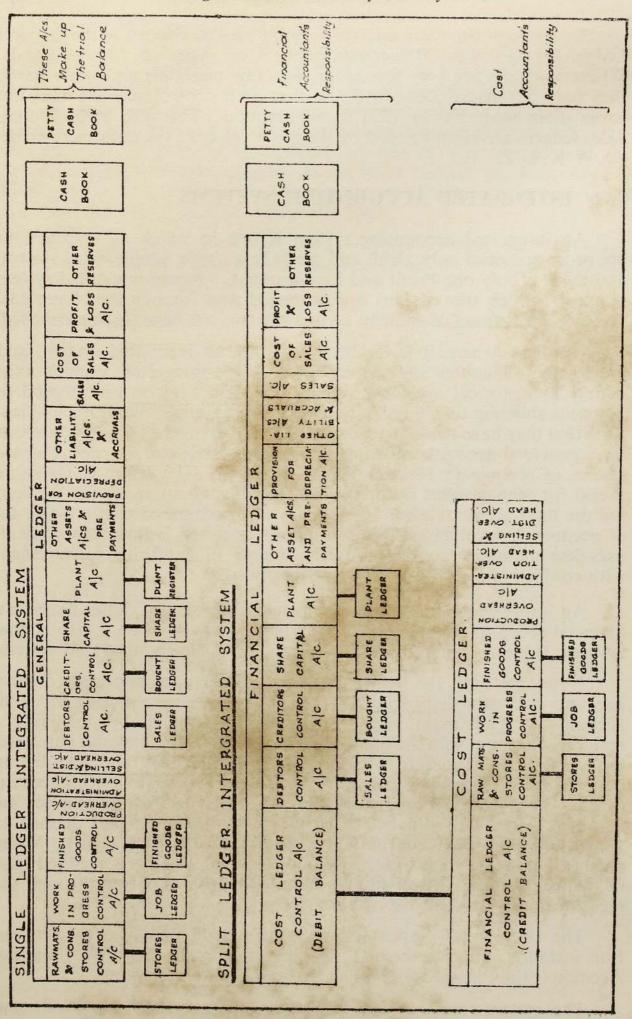
Needless to say, it is far better to have an integrated system, and avoid the difficulties of reconciliation. Non-integrated systems exist mainly as historical accidents. Managers have been so accustomed to accounts showing total salaries, total purchases, etc. (a natural classification) that they have tended to want to keep this even when cost accountants have provided accounts showing salaries, materials etc. for each separate source of revenue (a functional classification). The latter is far more useful for management purposes and, suitably summarised, can be used for the final accounts also. Nowadays it is recognised that a single set of accounts providing all the information required is far more efficient, uses less manpower, and avoids the danger of confusing management with conflicting answers to the same questions.

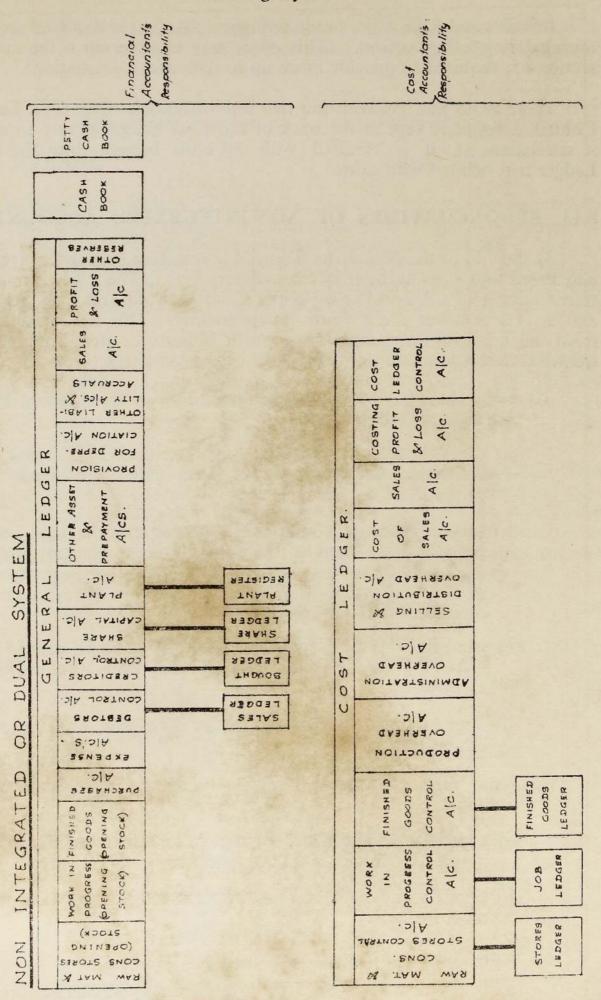
An integrated system does not prevent a division of duties between a financial accountant and a cost accountant. Illustrated on p. 516 is first, a single ledger integrated system, then a split ledger integrated system.

Note that both the financial ledger and the cost ledger use control accounts and subsidiary ledgers where there are large numbers of detail accounts. Each main ledger is kept self-balancing by including a reciprocal account with the other ledger. For instance, material purchases on credit are credited to Creditors Control account (and credited in detail in the Bought Ledger), and debited to Cost Ledger Control account by the Financial Accounting section. In the Cost Accounting section they are credited to Financial Ledger Control account and debited to Raw Materials Stock Control (and in detail in the Stores Ledger). When finished goods are sold, Finished Goods Control account is credited (and the Finished Goods ledger in detail) and the debit is passed through the reciprocal accounts to Cost of Sales account.

The division of responsibilities varies from one firm to another. For instance, the Finished Goods ledger may be kept by Financial Accounts; the Plant Register may be kept by Cost Accounts.

The system remains integral because there is only one Profit and Loss account.





Invoices and payroll are processed twice, first by the financial section, then by the costing section. (This order may be reversed if the costing section are required to provide more up to date cost information).

There is no link between the two sets of books. The Cost Ledger Control account is kept at the back of the Cost Ledger purely to make it self-balancing: it is credited with all costs brought into the Cost Ledger and debited with sales.

8.13 RECONCILIATION OF NON-INTEGRATED ACCOUNTS

At the end of the period the financial accountant prepares a Trading and Profit and Loss account in the ordinary way. The cost accountant transfers cost of sales and sales to the Costing Profit and Loss account and arrives at a net profit figure independently. This will often differ from the financial accountant's net profit because of items omitted or treated differently in one set of accounts or the other, e.g.

- (i) items that may normally be omitted from the Costing Profit and Loss account:
 - (a) other sources of income such as dividends, rents and discounts received, transfer fees, profit on fixed asset disposals
 - (b) certain costs of a financial character may be kept out of product costs, such as discounts allowed, overdraft interest, disposal of fixed assets, donations, tax, expenses, expenses of issue and redemption of shares and debentures, discounts on issue, premia on redemption
 - (c) sometimes the cost ledger does not include selling and distribution expenses; sometimes not even administration expenses
 - (d) appropriations of profit such as dividends, and write-offs of goodwill.
- (ii) items that may accidentally be omitted from the costing records, e.g.
 - (a) expenditure accruals and prepayments may not have been notified by the financial accountant;
 - (b) purchase invoices or sales invoices may have been missed on either side.
- (iii) items that may be differently treated, e.g.
 - (a) over or under absorbed overhead may be carried forward in the costing records whereas the exact costs are charged in the financial records

- (b) stock may be valued at cost in the costing records, but it will be shown at market value in the financial accounts if this is lower than cost
- (c) there may be different principles of valuing stock (and capital work in progress), e.g. as to the inclusion of overhead.

8.14 CODING

A code is a system of numbers, letters or other symbols which represent ordinary language. Its purpose is to condense data into a form which can be handled conveniently and economically. A good code is one in which coding and decoding can be done easily and without errors, and in which the data can conveniently be processed, transmitted, or stored, as required. A code should also leave room for future expansion.

Business data such as account codes for types of expense, revenue, asset and liability, types of raw material, supplies, parts and finished goods, names of customers, suppliers, personnel, branches, etc. are usually coded as numbers since these can easily be processed by most buisness machines.

Alphabetic codes have the apparent mnemonic advantage that they can use the initial letters of the item referred to, e.g. – P for purchases, PC for purchases of cotton, and so on. However, it is difficult to avoid duplication of codes. For instance, PC could also mean purchases of consumables, petty cash, or plant – cutting machines. There are also mixed (alphanumeric) codes. These have no special advantages.

Numerical codes may be made easy to remember:

(i) by using the progressive decimal (or group classification) code in which each digit is a meaningful classification, e.g.

2 = costs

21 = costs - manufacturing

215 = costs - manufacturing - weaving

2154 = costs - manufacturing-weaving-overtime

6 = assets

64 = assets - current

647 = assets - current-debtors

6473 = assets - current-debtors-ladies' shoes

If there are more than ten categories at any point, an extra digit is required, e.g. if finished goods are to be classified over more than ten product groups, two (or more) digits will be required to denote the product group.

This code is often used for inventory, since the total classification prevents duplication of the same items under different names.

'Appendix 1' illustrates this code.

This system may be compared with the block code in which only the first digit is classifying, and other digits are merely a serial number, e.g.

001 - 099 = assets 100 - 199 = liabilities 200 - 299 = revenue 300 - 999 = costs

This is still very popular for accounts codes.

Usually it results in a shorter code than the progressive decimal code, though not all digits are meaningful;

- (ii) by using the shortest possible code, and using groups of three digits where possible. Most firms can contain their accounts code within three digits, i.e. they have not more than 999 main accounts, and cost centre codes within a further two digits (up to 99 cost centres). This is a maximum of five digits. However, it may be that fewer mistakes are made on a six digit code than on a five digit code, where the code is in groups of three, e.g. 657.261 (See "Classification and Coding of Accounts" by J. M. S. Risk, Published by I.C.W.A. page 28). It is also easier to remember codes if they are all the same length;
- (iii) by integration and interlocking. The accounts code may interlock with the raw materials code, with the spare parts code, etc., by making the last digit of the accounts code the first digit of the inventory code. Also the accounts code may be internally integrated by using the same digit classification;
 - (a) for the different classes of fixed assets as for the provision for depreciation on those assets, and for the expenditure charge,
 - (b) for different products in inventory as for sales revenue from those products,
 - (c) for different raw materials and stores in inventory as for expenditure on the same.
- (iv) by reserving certain digits for particular purposes, e.g. nine is often kept for items not elsewhere specified; nought is often kept for control accounts;
- (v) by various *mnemonic* devices, e.g. if drills are stocked in sizes from \(\frac{1}{8}'' \) to 1" these can be coded 1 to 8. Personnel numbers may incorporate the year of birth. Location codes may incorporate their distance in miles from the Head Office;
- (vi) by preparing an *index* in which items are listed alphabetically, and their code numbers shown. An index soon becomes unnecessary with a progressive decimal code; it is most necessary where codes include few or no classifying digits.

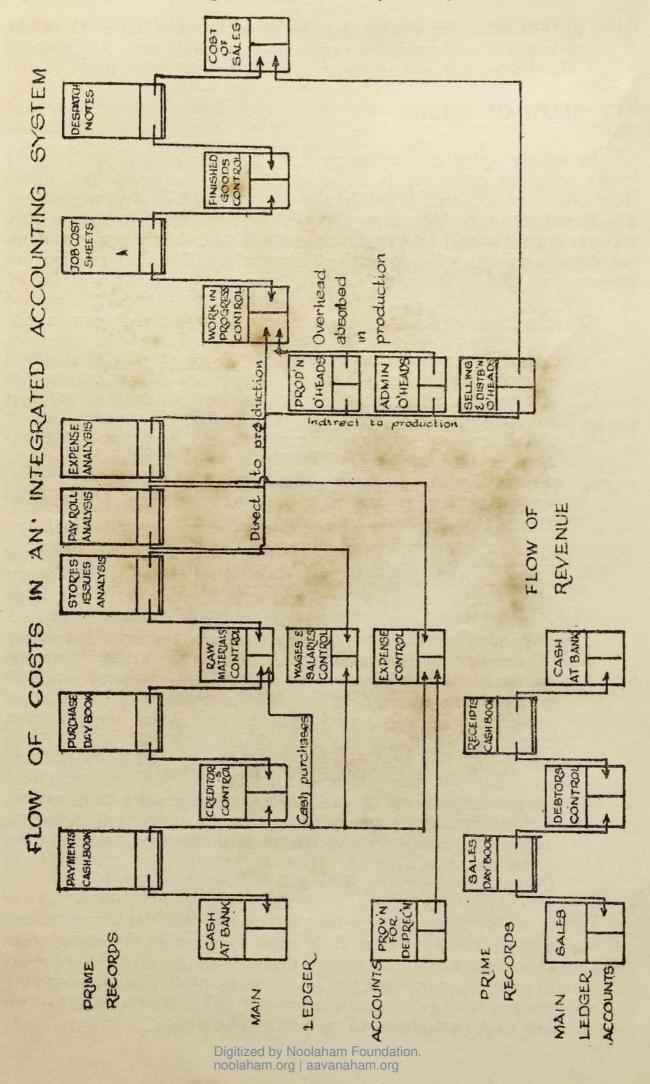
Modern accounting practice is to arrange accounts in the ledger in code number order for easy reference. Alphabetical order is used only in personal ledgers.

8.15 FLOW OF COSTS

In an integrated accounting system, costs are picked up from the books of prime entry (or in some cases, from the source documents themselves; see section 8.18 on the slip system) and posted to the ledgers. The flowchart on p. 522 shows a typical system in which each control account in the General Ledger is backed up by a subsidiary ledger containing detail accounts. For greater clarity the subsidiary ledgers are not shown.

There are many variations from this basic simplified system, e.g.

- (i) in a system of process costing, the Work in Progress Control account (which controls the Job Ledger) would be replaced by a Process Cost Centres Control account controlling a ledger with one account for each process or main operation. If there are very few process cost centres, the process accounts may be kept in the General Ledger and a subsidiary ledger dispensed with. In process cost accounting, finished production will be credited to process cost centres and debited to finished goods from production reports (not job cost sheets)
- (ii) in this system, it is assumed that production overheads and administration overheads are absorbed in production by means of a blanket overhead absorption rate, such as a percentage of direct wages, or a labour hour rate, or machine hour rate. If products are very diverse, and require different amounts of service facilities, a single blanket rate is not sufficiently accurate. It is usual then to replace the over-head accounts by a separate account for each service department (or group of services), such as steam, water, mechanical maintenance, electrical maintenance, production control, work purchasing, accounts, personnel and so on, and to charge each service to the production cost centres (jobs or processes) on a usage basis. If the usage of a department cannot be measured, then the best approximation is made. This is more complicated, and costs more in clerical time but provides more accurate costs and aids control. (For an example, see Principles of Cost Accountancy by Buyers & Holmes, Chapter 10)
- (iii) it is also assumed here that selling and distribution overheads are absorbed in the cost of sales by a single absorption rate. (They should not of course be included in the value of work in progress or finished goods). As with production and administration, selling and distribution overheads may be broken down, and each part absorbed on a suitable basis.



8.16 FLOW OF COSTS IN A STANDARD COSTING SYSTEM

A standard costing system is one in which, at some point in the flow of costs, they are converted from actual costs to standard costs (ref. section 4.16), the differences or variances being diverted to special accounts for investigation. Standard costing systems differ only in the point at which particular costs are converted to standard. For example, the cost of raw material may be converted to standard at the point of receipt in the stores or at the point of issue to production.

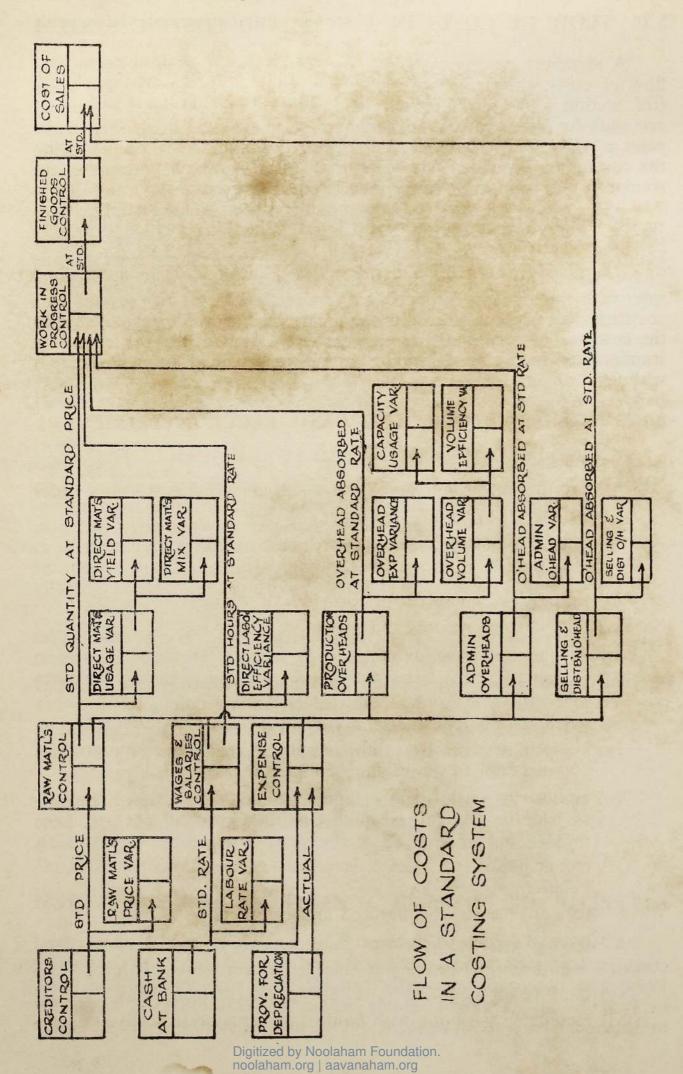
Before going further, it should be noted that standard costs may still be used without incorporating them into the double entry system. Standard costs may be used to control actual costs in the same way as budget costs, that is by regular reports showing the comparison, side by side, with the variance analysed as far as required. Similarly standard costs may be used for pricing and estimating without bringing them into the cost accounts themselves. All the advantages of having norms or standards of performance, physical as well as financial, may be achieved without bringing them into the double entry system. On the other hand, double entry imposes an arithmetical check; this advantage should not be forgotten.

(The diagram on page 524 illustrates a typical system...)

- NOTE: (1) in this system, raw materials price variance is extracted on purchase and entry into stores, not on issue from stores. (This has the advantage that any adverse price variance, which is the responsibility of Purchasing Department, is charged in the period of purchase, not of use. Also, all stores records are kept at standard prices, which is clerically simpler);
 - (2) similarly, the labour rate variance may be extracted before debiting Wages and Salaries Control. However a common alternative is to extract labour rate and efficiency variances together;
 - (3) it is assumed in this chart that all expenses are indirect to production; they are charged out to work in progress at standard rates, leaving variances for analysis;
 - (4) the disposition of variances is not shown here. Usually they would be transferred to the costing Profit and Loss account at the end of the year, in the same way as Cost of Sales.

8.17 FLOW OF COSTS IN A MARGINAL COSTING SYSTEM

A marginal costing system of book-keeping is one in which fixed costs are separated from variable costs and charged directly to the costing Profit and Loss account. Only variable costs pass through the Work in Progress and Finished Goods accounts. This makes it easier for management to plan changes in output and to control costs while the



rate of output is changing; since changes in output affect only the variable costs. On the other hand, the balances on Work in Progress and Finished Goods accounts represent only the variable costs of producing these assets; most accountants and auditors feel that a stock valuation should include a fair share of fixed costs incurred in producing the stock.

As with standard costing, it should be made clear that the management advantages of marginal costing may be obtained without altering the accounting system. Many firms distinguish which cost items are fixed and which are variable, then group fixed costs separately from variable costs in all cost statements and reports. The costing system remains a "full cost" system, and stock valuations include their due share of fixed costs.

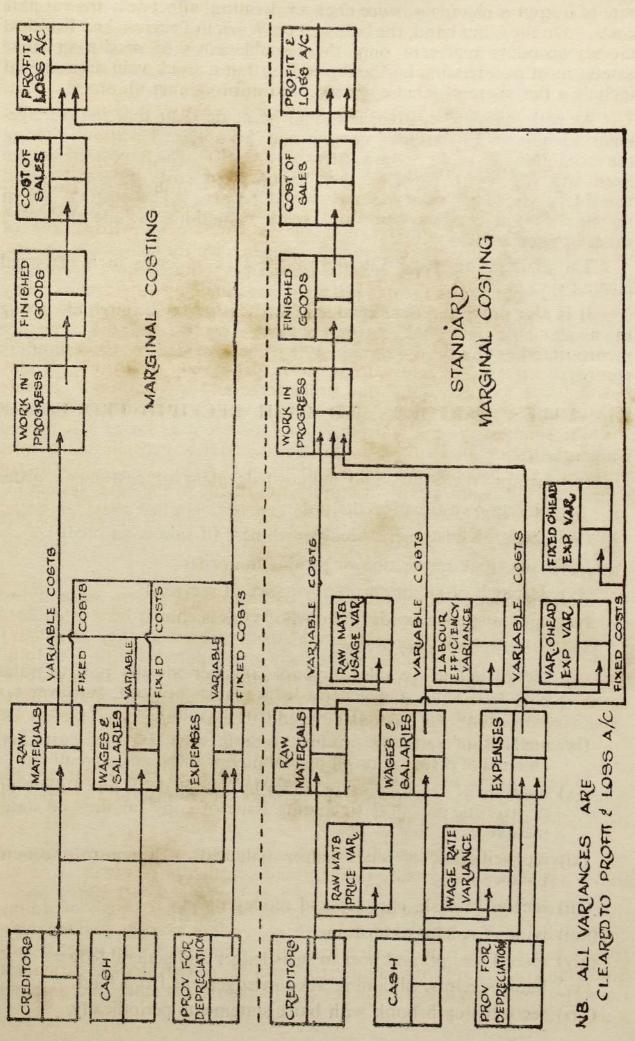
The diagram on page 526 shows the flow of costs in a marginal costing system.

It is also possible to combine standard costing and marginal costing in a standard marginal costing system. As before, this may be incorporated in the book-keeping system, or provided by memorandum records.

8.18 SALES, DEBTORS, AND CASH RECEIPTS PROCEDURE

This includes:

- (i) receipt, recording, and acknowledgement of customer's order
- (ii) pricing or estimating the order
- (iii) check on customer's creditworthiness (if sale is on credit)
- (iv) issue stock requisition or production order
- (v) despatch of goods (or performance of services)
- (vi) update stock records and cost of sales accounts
- (vii) prepare and issue invoice
- (viii) record invoice in sales daybook and periodically post to sales ledger (if kept) and general ledger (sales account, turnover tax account (if applicable) and control account)
- (ix) analysis of sales by product, month, area, type of customer, channel of distribution, shop, counter or salesman, as required
 - (x) analysis of sales ledger balances by age of debt, and follow up of overdue accounts (including issue of copy invoices or statements)
- (xi) reconciliation of sales ledger balances with control account balance
- (xii) receipt of cash, cheques and money orders
- (xiii) issue of receipt to customer
- (xiv) record receipt, and post to sales ledger and general ledger
- (xv) bank receipts, obtaining acknowledgement from bank
- (xvi) reconcile cash book with bank statements periodically.



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It will also include sub-routines for dealing with back orders, part deliveries, payments on account, returned goods, returnable empties, invoice errors, price list revisions, write-offs, cash discounts, cash sales, employee sales, export sales, hire purchase sales, fixed asset sales, scrap sales, goods on consignment or sale or return, direct shipments from supplier to customer, miscellaneous cash receipts, salesman's commission, etc.

In the simplest possible credit sales system, one well – designed form acts as customer order, request for credit check, authority to stores to release goods (or to workshop to produce them), instruction to despatch section to despatch, confirmation of despatch, acknowledgement of receipt of goods, invoice to customer, copy invoice for follow up, receipt, and paying in slip. This avoids transcribing information from one form to another. The form is prepared in a single operation in as many copies as necessary, and data is added to it as it passes through the above sequence.

In practice it is not usually possible to use only one form. It may be necessary to have a separate order form and invoice, or a separate invoice and despatch note. However a useful approach is to start with the simplest system, and only to complicate it as far as it is proved necessary. (For an example of how unnecessarily complicated a sales procedure can become, see "Applications of O & M" by G. E. Milward pages 4/5). It is not usually necessary to provide in the basic system for all variations and exceptions; if these can be identified they are better dealt with separately.

Orders

Careful control should be kept of customers' orders since a lost order means lost profit or lost goodwill. Orders should be written onto a serially numbered standard order form (however they originate). Orders may be acknowledged if they will take appreciable time to fulfil. The customer's confirmation should be obtained if there is any doubt as to the terms of the order. Before acknowledgement, three things should be checked; the customer's credit, the availability of the goods, and the expected delivery date.

Where orders are to be produced (rather than met ex stock), the delivery date will be obtained from production control, and entered on the acknowledgement of order.

It is the responsibility of the orders department, (or sales office) to follow up orders and ensure delivery and satisfaction.

While orders are not normally brought into the system of double entry, they should be recorded on memorandum records and analysed to ascertain trends, remembering that sales trends start with order trends. Sometimes orders are entered into stock records so that stock is earmarked for a customer, but it is usually better to separate out stock and despatch it as soon as possible.

Credit check

For existing customers, the most usual credit limitation is on the maximum balance outstanding (see section 6.14). This should be written on the customer's account so that both limit and actual balance are at hand when an order is received. Even this may be too elaborate or difficult to keep up-to-date. Many firms simply operate a "stop list" and supplement this with close follow-up after despatch. (A stop list lists customers to whom credit will not be given, or only after certain precautions).

Stock requisition (issue order, or shipping order) is an instruction to the storekeeper to release the goods and to the shipping or transport section (if any) to despatch them to the customer. The storekeeper must retain a copy to account for not having the goods; he may use this copy also for updating his own stock records (bin cards).

Independent stock records or at least a stock control account should be kept, usually by the cost accountant, or materials controller (if any). The respective stock items will be credited and cost of sales account debited from a copy of the stock requisition after the goods are issued.

It is usually assumed in basic accounting textbooks that no continuous stock accounts are kept and that stock is accrued only at the end of the year (credit opening stock, debit trading account, debit closing stock, credit trading account). This is bad practice as there is no book figure to say what stock ought to be in existence; in effect stock losses, pilferage, etc. are hidden in the trading account. Cost accountants have drawn attention to this lack of control, which would not be tolerated on cash. Stock is no less important than cash and should be included in the system of double entry. In an integrated system, separate accounts are kept for each raw material and each kind of consumable store, spare part, etc., for unfinished work in each process and for each kind of finished goods. Since these are numerous, they are controlled by control accounts.

If the firm undertakes the despatch of goods, the despatch section must obtain the signature of the customer as proof of delivery.

Sometimes a separate despatch note is raised to accompany the goods and get the customer's confirmation of receipt.

Invoicing (billing) may be done immediately on despatch, or despatches may be accumulated (batched) and invoiced at convenient intervals. It is a most important link in the chain of internal control that every despatch is invoiced. If despatches are serially numbered, it is easier to see that they are all accounted for.

Where the volume of invoicing is very high, and many customers are sent more than one invoice a month, it may be worthwhile to replace one-at-a-time invoicing, by a monthly statement with detailed invoices attached. These statements are not all sent at the end of the month, but are spaced out during the month so that there is an even flow of

work, e.g. customers with names beginning 'A' may be invoiced on the 1st of the month for despatches up to the previous day; 'B' customers are invoiced on the 2nd of the month for despatches up to the 1st, and so on. This is known as cycle billing.

Sales invoices are usually high usage forms, so small improvements in design can yield big savings in preparation and despatch time. If prepared by typewriter or accounting machine, continuous stationery should be used. This allows copies to be produced by carbon paper without the trouble of inserting carbons and aligning copies. After typing, invoices are separated by bursting the perforations. An alternative is snap-out sets, which are arranged so that interleaving carbons can quickly be snapped out. If most sales are for a limited number of items, these should be pre-printed on the invoice to avoid unnecessary typing or writing. Invoices may be designed so that they can be posted without envelopes, or they may be designed to use window envelopes (which saves retyping the name and address). Advice on stationery should be obtained from the firm's printer.

The number of copies varies in different firms from 2 to 20. As before, it is a good approach to start with the minimum, that is, one to the customer and one for follow up, then allow extra copies only if they are proved necessary. Additional copies cost no extra labour (unless typing mistakes have to be corrected on all copies), but the extra costs of paper, handling and storage can be high. For instance, customers do not generally need delivery note or advice note copies of the invoice; sales statistics can use the same copy as is used for posting to the ledger and so on.

Methods of invoicing may be purely manual, using desk calculators or ready reckoners for multiplying prices and quantities, and perhaps an addressing machine for printing customers' names and addresses, and standard sales items. There are also various mechanised procedures, using accounting machines or punched card equipment, and there are electronic computer systems. "Invoicing Methods" by British Institute of Management describes 26 different methods in use.

Sales invoices should always be checked before despatch, since an undercharge will probably never come to light, and an overcharge reduces customers' goodwill.

Recording and posting sales invoices

In textbooks on elementary book-keeping, sales are entered in a sales day book from copy invoices, then posted individually to customer accounts in the sales ledger, and in total to Sales account, and to Debtors Control account. Present day practice more often is to post invoices directly to the sales ledger (thus avoiding errors in transcription). At the same time it is possible to get a carbon copy list of invoices (which is in effect a sales day book), and a carbon copy of the ledger account (for use as a monthly statement to the customer). The total invoice value is then posted to the nominal ledger as before.

This illustrates the "three-in-one" principle which is of fundamental importance in accounting procedures. Three records are obtained in one writing or typing or machine operation by the use of carbon paper. The problem of how to align the records so that the carbon entries are made in the correct places is solved by the pegboard in manual procedures, and by the accounting machine in mechanised procedures. (The pegboard is simply a board with pegs at the side onto which specially designed stationery will fit).

In the above operation, it is necessary to have loose leaf ledger accounts not bound ledgers, (see section 8.23(x)). If most of the accounts are affected by a batch of invoices, the invoices are "stuffed" in the ledger alongside the respective accounts as a separate operation from entering them, so as to reduce the risk of posting to the wrong accounts. If most invoices are to be posted to relatively few accounts, these accounts are "pulled" from the ledger before the posting operation. It is not necessary to record in the ledger more than the date, reference number, amount, and short details, viz. GDS, RETS, CASH, DISC., etc. A great deal of time can be wasted duplicating details which could instead be referred to if and when required.

Ledgerless accounting (slip system)

It may be asked why it is necessary to record the invoice in a sales ledger at all. If invoices are kept in a file and removed as they are paid, the remaining invoices at any time represent outstanding debtors. These can be kept in customer order so that the amount outstanding from any customer can be readily seen, and analysed by age of debt, for purposes of credit control. On payment, the invoice can be dated with the date of payment then filed in customer order in a "Paid" file as permanent record of dealings with that customer.

There is no loss of information, and often a considerable saving in the clerical time spent in posting and balancing customer accounts. However there is a potential loss of control because the invoice represents the sole record of the amount outstanding. Therefore *physical* control of the "Unpaid" file should be reinforced by *total* control by means of a Debtors Control account kept independently. The total of invoices outstanding should be regularly agreed to the balance on Debtors Control account.

The system is simple and there are no problems of keeping the ledger up-to-date. It is most suitable where receipts can clearly be identified with invoices. Where customers make pre-payments or payments on account, or where there are special features such as rebates on volume, their accounts can be kept on conventional ledger cards without prejudice to the basic slip system. For the experience of companies with up to 26,000 customers' records kept by this method, see "How to Control Office Costs" by H. H. Longman (Anbar) Chapter 13.

Analysis of sales

Often sales orders, despatch notes or invoices have to be sorted into various categories (products, customers, branches, areas, salesmen,

etc. and between the elements in the total such as freight, discount and turnover tax) and each category summarised. There are several methods of sorting:

- (i) sales can be entered in a columnar daybook, and each column totalled. This is still possible where a single invoice includes items for more than one column. The number of categories should be limited, otherwise the book becomes unwieldy. Inactive categories may be grouped under "Sundries" and analysed by analysis sheet. Posting column totals to the ledger is more efficient than posting individual entries, however the method wastes a lot of paper space;
- (ii) sales documents may be entered on an analysis sheet, each category in a different place, and totalled;
- (iii) "slip adding" (selecting one category at a time from documents and adding on an adding or add-listing machine) is one of the commonest methods of analysis. The disadvantage is that the clerk has to go through the documents separately for each category (the "exhaust method") unless he has a machine with more than one register;
- (iv) if sales documents are designed so that each category has its own line or space, documents can be assembled on a board so that they overlap across or down the board and figures to be added appear together. This is also called "shingling" or "strip accounting", and is much used for summarising data. Alignment is made easier by using a pegboard or summariser board, and adding is made easier by a T square (for cross-adding), or by a template with holes cut for the required figures (cross-adding or down-adding). The number of categories is limited to what can conveniently be pre-printed on the document;
- (v) if sales documents are "unit records" i.e. only one category on each invoice, they can be *physically* sorted (either on a flat surface like sorting playing cards into suits, or into pigeon-holes or trays (as used for sorting mail) or in a simple flap sorter, which has an index-tabbed flap for each category; each category can then be easily totalled on an adding or add-listing machine. Even when sales documents include more than one category, it may be economic to unitise them, either by requiring a separate invoice to be made out for each category, or if possible, producing unit tickets as a by product of billing. This method is advantageous when (a) sales have to be analysed in different-ways, (b) there is a reasonably large number of items in each category, and (c) total volume is high;
- (vi) posting to a ledger is also a sorting operation; invoices are sorted by customer when they are posted to the sales ledger and they have to be sorted by product also for posting to the

respective sales accounts. Invoices can be posted in the same order as they come or by the "exhaust" method, i.e. posting all invoices to the first account then all to the second account, and so on, till all invoices are posted. Since one invoice is for one customer they can also be physically sorted, and stuffed into the ledger at the relevant accounts.

This is much the same as using a flap sorter;

- (vii) in an accounting machine system, sales are entered in a single operation on the ledger card, statement and day book (proof sheet), and the total of all entries is accumulated in the machine for comparison with a pre-list at the end of the batch. Most accounting machines will at the same time accumulate a limited number of categories of sales; some machines have up to 30 separate registers (accumulating mechanism). The machine operator sorts entries by selecting and depressing the key for the appropriate register; another key provides a mechanically calculated total for each category;
- (viii) some cash registers not only records cash sales but also analyse them, again by depressing the appropriate keys at the time of sale; up to 27 categories can be accumulated;
 - (ix) there is an analytical accounting machine which has 198 registers, and is very suitable for sales analysis where the number of categories is too great for convenient manual sorting, but the amount of sorting is insufficient to justify punched cards;
 - (x) punched card equipment was originally designed purely for sorting and summarising. These operations are performed very rapidly by a sorter and a tabulator. The sorter works from cards which have been punched (holed in the appropriate positions) with information from sales documents. Though punching is an extra operation, it may be justified if sales have to be sorted and summarised in several different ways, e.g. by product, by customer, by area, etc;
 - (xi) there are also punched cards for manual sorting by means of a needle. The capital cost is low, and sorting can be even faster than with the electro-mechanical sorter, but there is no simple way of summarising. Needle-sort cards, either edge-punched or centre-punched, are more useful for personnel data or research data than for sales analysis;
- (xii) computers at present still get their input mainly through punched cards or punched paper tape. Sorting and summarising are entirely electronic, and printing is electro-mechanical. Punching as a separate operation may be avoided by having it as the by-product of some other operation, such as entry into an accounting machine, or by various means of direct entry into the computer such as mark sensing, magnetic character reading, and optical character reading. The most futuristic development is automatic date collection (without human intervention).

Note that several sorting methods require a rewriting (or punching) operation.

Posting is sorting and rewriting twice (debit and credit). In a sales journal the credit entries are aggregated, and posted as totals, but the debits are still posted (re-written) one at a time. If the sales journal is eliminated and postings are made direct from invoices (the modern practice), one writing is avoided and it is possible to sort invoices physically by customer and reduce the time spent searching for accounts. Credit totals are found by pre – listing on an adding machine. This is also a re-recording operation but is no more than is necessary in a handwritten journal.

In columnar analysis the amount is written in the total column, then again in the analysis column. The analysis sheet is the same except that analysis after the event takes longer than analysis of transactions as they arise.

Slip adding avoids re-writing, but is more arduous unless most items are for a few account categories. Strip accounting also avoids re-writing but requires the additional operation of pinning or pegging documents in position. Similarly physical sorting is an additional operation. The accounting machines and cash registers with several registers allow sorting without re-writing or any other operation apart from depressing a key, but of course are relatively expensive. The method of sorting will depend on volume, the number of sorts required, the number of categories in each sort, and whether all categories are equally active or there are wide differences. As always, the preferred method will be the one that gives the required information at lowest overall cost.

Ageing debtors and follow-up

Ageing is also a sorting operation; the outstanding balances are divided into their component invoices, which are sorted and listed into age groups, e.g. under 1 month old, 1-2 months, 2-3 months, 3-6 months, and over 6 months.

In the conventional ledger record, the date of each invoice must be shown (not the date of posting it to the ledger); each account is then analysed by hand and outstandings entered on a columnar analysis sheet. If a statement is sent, it is better to make it a copy of the ledger account itself than simply a statement of the balance owing, since the customer can more easily check the former against his own records and pass it for prompt payment. Statements are better prepared as carbon copies of the ledger account (the three-in-one principle) than by end-of-month copying.

In the ledgerless (slip) system, balances are represented by copy invoices filed (usually) by customer. They may be aged by re-sorting according to date, and then add – listing or, if this involves loss of physical control, a duplicate file may be kept for this purpose. This operation may be combined with reconciling to the control account, and also writing

statements to outstanding customers. The most useful form of statement is the "open item" statement which merely lists unpaid invoices with their dates and reference numbers, and the total amount due from the customer.

It is not always necessary to send statements. Where a customer gets only one or two invoices a month, these may be printed: "The above amount is now due. No statement will be sent." If he fails to pay, a copy of the invoice is sent. This is far simpler (cheaper) than preparing and posting statements to all customers, the majority of whom would pay within the following month without reminder.

Cash receipts

Internal control on the receipt of cash requires separation of cash handling from cash recording as far as possible and fixing of responsibility for each function.

Cash may be received through the mail (cheques, money orders, stamps, etc.), or by the cashier (coin and notes as well as above), or by a salesman or collector authorised to receive cash, or it may be deposited directly in the firm's bank account. In each case there should be a supporting document: for cash received by post, there should be an invoice attached (if in payment of the firm's invoice) or letter or other remittance advice (or failing these, the envelope itself); for cash received by the cashier there should be a serially numbered receipt; for cash collected by salesmen there should be a route book and/or a serially numbered receipt; for cash deposited at the bank, there is an advice note from the bank.

Mail is usually opened by a separate officer or department. Cheques, etc. should be immediately crossed to the firm's bank account and listed in a Cash Diary or Register, before being passed to the Cashier for banking. The Mail Officer must be a trusted man and fidelity bonded since at this point of origin, both cash and supporting documents are in his hands.

The remittance advice is date-and-time-stamped and checked to see that the customer's name, amount, date, and cheque number are correctly entered. Cheques, etc. are then detached and passed to the Cashier, and supporting documents to Accounts.

Many firms have the Cashier keep a Cash Book which is compared daily with the list of cheques, etc. received. This involves extensive rewriting. The same internal check may be achieved by having the Mail Officer prepare the original record in 3 copies. One copy goes to the Cashier with the cheques, for which he signs a copy retained by the Mail Officer. The third copy goes to Accounts for entering discounts allowed and posting.

The Cashier should bank all receipts intact the same day. The reason for this is not only to reduce the chance of loss, but also to improve the bank balance, thus allowing the business to earn more profit, or to save interest. The Cashier prepares the Paying-in Slip, (the bank may

accept instead a copy of the Cash Receipts Sheet if the design of this form meets their needs), obtains the bank's acknowledgement (i.e. transfer of responsibility for custody), and sends copies to Accounts.

A pegboard or accounting machine may be used to write the receipt (2 copies), Paying-in Slip (2 copies) and Cash Receipts Sheet simultaneously.

Note that receipts counterfoils and even carbon copies are no evidence of the amounts actually received (in the case of cash paid directly to a collector or cashier making out the receipt). Cash registers and autographic registers incorporating sealed till rolls provide better evidence of actual receipts since they are not so easily manipulated. However, not all customers demand (or look at) their receipts. The control on original receivers of cash is by reference to the amounts owing. If a customer protests that he has already paid and proves it with a valid receipt the onus is on the signer of the receipt to account for the amount. For cash sales, it is essential to compare cash receipts with the decline in stock levels (at selling prices).

Whether the Cash Book is a bound book, or a binder containing Daily Cash Receipts Sheets, its layout should facilitate posting, reconciliation and internal control. The common form of Cash Book has columns each side for discount, cash and bank, plus date, details, reference number and posting reference columns. If all payments, other than for petty expenses, are made by cheque (which improves internal control), and all receipts (both cash and cheques) are banked intact daily, cash and bank columns can be combined. This, however, should be supplemented by analysis columns so that column totals can be posted instead of individual items. For instance, a separate column may be provided for all amounts received from debtors under each control account.

When the business grows to the point that one man cannot enter both receipts and payments, the Cash Book may be divided into a Receipts Journal and a Payments Journal, from which batch totals may be posted to a controlling Cash at Bank account in the General Ledger.

Sometimes a firm opens separate bank accounts, and a separate Cash Book for each bank account. If there are in fact separate funds within the business with restrictions on their use, control is made more sure by putting money in separate accounts. However, the arbitrary opening of accounts with self-imposed restrictions on their use complicates both book-keeping and cash management. (This is why the State has a single Consolidated Fund for all receipts and all payments).

Posting cash receipts to ledger

Receipts may be analysed on entry into an Analysis Cash Book (or Cash Receipts Sheet with analysis columns), so that column totals may be posted monthly to the relevant accounts (such as Debtors Control, Employee Loans Control, Scrap Sales, Income on Investments, etc.) However, receipts from individual customers must still be posted to their accounts in the Sales Ledger. Three basic methods are as follows:

- (i) hand posting from the Cash Book or copy receipt to the Ledger, either random posting (i.e. in order of entry in the Cash Book) or exhaust posting (i.e. first exhausting all postings to the most active customer, then to the next most active customer, and so on). If the copy receipt shows discount allowed as well as the net payment it is a unit record which can be physically sorted into alphabetical order of customer name, for easy posting. If monthly statements are sent, these should be posted at the same time using pegboard and carbons. Usually the statement is the top copy, the ledger account the second copy, and a proof sheet (to prove the total of all credits to Debtors Control Account) is the bottom copy. At least one manufacturer has a loose leaf binder for proof sheets which do not need to be extracted for entries - ledger card, statement and carbons are inserted, quickly aligned, and all three entries are made simultaneously:
- (ii) posting by accounting machine is similar in principle to the hand method. If posting media are copy receipts these should be sorted and "stuffed" into the ledger in front of the relevant customer cards. If there are only a few customers paying, their account cards may be "pulled" from the ledger tray and copy receipts attached, ready for the machine operator. The operator puts the ledger card, statement and interleaving carbon in the front feed of the machine and the proof sheet in the rear feed, and enters the amount of the receipt, and the old balance. (For methods of pick-up proof, etc. see section 8.23(v). The machine automatically calculates and prints the new balance, and accumulates the total of all receipts entered, and all discounts entered for proving at the end of the run or batch;
- (iii) in the ledgerless (slip) system, the relevant invoices are pulled from the "outstanding" file, stamped "paid", and transferred to the "paid" file. No book entries are made except to control accounts.

Bank reconciliation

Essentially, a bank reconciliation is a check on the cashier that receipts shown in his Cash Book were in fact deposited in the bank, and that no payments have been made except as recorded in the Cash Book. If the cashier makes his own reconciliation there is a loophole in the system of internal control; the bank statement should be received and reconciliation should be made (or at least checked) independently.

If all receipts are banked daily, there should be no difficulty in reconciling receipts. There will usually be some cheques, etc. received too late for banking on the same day, and some items deposited but not yet credited by the bank, but these should be easily indentifiable.

N.B. Receipts should be entered once only, not separately for receipt, deposit in bank, and credited by bank.

8.19 PURCHASES, CREDITORS AND PAYMENTS PROCEDURE

This includes:

- (i) a purchase requisition from a department requiring materials or services.
- (ii) a requiest to suppliers for quotations, or invitation to tender, and comparison of prices, quality, reliability, etc.
- (iii) issue, recording and follow-up of purchase order.
- (iv) for materials, receiving, inspecting and taking into stores,
- (v) receive and record invoices from suppliers and discounts receivable
- (vi) approve invoices, and pay by cheque
- (vii) post invoices and cheques to ledger accounts
- (viii) obtain receipts and match with payments
 - (ix) reconcile cash payments with bank statement.

It will also include sub-routines for purchases returns, reports to management on prices of key materials, and on threatened delivery delays, import and exchange control procedures, material purchases delivered direct to site, capital purchases, petty cash purchases, etc.

There is opportunity in the purchases procedure as in the sales procedure for reducing the number of forms in use, and making them work harder.

Purchase requisition or Request for Purchase may be raised by Production (Production Planning and Control) for production materials, by the Maintenance Manager for maintenance parts, by the Sales Manager for display materials, by the Office Manager for stationery and office services, etc. The requisition specifies the material or service required, when and where it is resuired, account to be charged, and any price limit (to enable the requisitioning department to take alternative action if the price threatens their budget limit). Authority to raise requisitions is usually limited to departmental managers. It is raised in 2 copies. One copy is sent to the Purchasing Department for action, and one retained for follow-up. For an item that is ordered repeatedly, a travelling requisition may be used. This is a card which is filed alongside the relevant stock record card. When the item reaches re-order level, the order quantity is filled in, and the card is sent to the Purchasing Department who order the goods, and return the card.

Purchase order

Purchasing is normally centralised in order that requisitions may be aggregated and better terms obtained from suppliers. In a multi-plant business this sometimes results in undue delays or losing advantageous prices available locally. Plants may therefore be allowed to make local purchases, but only for certain items and within certain value limits.

Centralised purchasing does not of course entail centralised stores. Decentralised stores may have their requirements delivered directly from suppliers on orders issued centrally, specifying the quantity required at each delivery point. Bulk discounts are often given on the quantity ordered, irrespective of the number of delivery points (or even, sometimes, the number of part-deliveries to a single delivery point).

Another reason for centralised purchasing is internal control. A firm may be committed by any employee purporting to order in the name of the firm. Precautions are taken by limiting authority to order (and even limiting all contacts with suppliers) to the Purchasing Department and by using a standard official order form carrying a notice to suppliers that no other form of order will be honoured.

A typical purchase order set has 5 parts (copies). The original goes to the supplier. (It is not usually necessary to send an additional copy to the supplier for him to acknowledge and return as he would have a standard acknowledgement card). Second copy is filed alphabetically by supplier for follow-up. Third copy goes to the requisitioning department (e.g. for filling in the "on order" column on stock record cards). Fourth copy is filed by serial number. Fifth copy goes to the Gatekeeper (or Receiving Department).

It is the responsibility of Purchasing Department to follow up all orders and ensure delivery by the date specified. Part deliveries should be entered and accumulated against the total order.

Receiving, inspection and receipt in stores

The Gatekeeper (or Receiving Department) checks the apparent quantity and description of the goods per the supplier's despatch note, compares with his copy of the order, and makes out a Goods Received Note (this may conveniently be an endorsement on a copy of the purchase order, or he may use the supplier's despatch note, thus avoiding the copying of particulars. However some firms prefer a separate report from the Gatekeeper for independent comparision with the order; in this case the Gatekeeper is not given a copy of the order).

Copies of the Goods Received Note must go to Purchasing Department (for marrying up with the order and passing to Accounts pending receipt of the supplier's invoice) and to the Stores receiving the goods. There may be a Receiving Inspection unit attached to Stores to ensure quality control on all purchased materials. If this is not a separate unit the Storekeeper is responsible for checking quantity and quality himself. He then transfers the goods physically into their respective bins, shelves, etc. and enters them in his bin cards or stock record cards. If re-ordering is based on stock records (rather than on physical stocks), it is essential that these are up-dated promptly from Goods Received Notes and requisitions.

Cost Accounting Department usually keeps a Stores Ledger which shows costs as well as quantities. Purchase prices may be obtained from the order, or standard prices may be used, so that the Stores Ledger can be posted from the GRN. The alternative is to wait for the invoice and post the actual price. This has the advantage that it avoids having to post any differences between the order price and actual price, but the disadvantage is that book stock will always be in arrears of physical stock, and similarly liabilities will not be up-to-date. It should be remembered that the liability on the goods usually accrues when the goods are received and accepted (or even at the time of ordering in the case of specific goods), not when the invoice is received later, nor when it is approved for payment.

A clear procedure must be laid down for purchases returns to ensure that they are not paid for. Often they are returned with a debit note. When the supplier's credit note is received, it is married to a copy of the debit note.

Receive and record invoices from suppliers. If invoices have to be sent to Purchasing or to requisitioning departments for checking, it is essential for Accounts to keep control over their issue and return. Also, Accounts must know at any time the total liabilities outstanding, both approved and in course of approval. Therefore, invoices, may be received by Accounts, and listed before issue to approving departments.

At the same time, control can be set up on the collection of discounts receivable by recording the due date for payment (the last day on which the cheque can be issued in order to qualify for discount).

Approval of invoices and payment

Invoices may be checked and approved for payment by Accounts, or (especially where they are highly technical) by Purchasing or requisitioning departments.

There are six points to be checked before an invoice can be approved for payment:

- (i) was the purchase authorised? (refer to the Purchase Order)
- (ii) were the goods or services receive as ordered? (compare Purchase Order with Goods Received Note, seeing that the storekeeper has accepted responsibility for custody; in the case of services, see that the appropriate departmental manager has certified receipt; compare not only quantity, but also specification, quality, and time and place of delivery).
- (iii) is the invoice in the same price and other terms as the Purchase Order.
- (iv) is the invoice arithmetic correct? (extension of price X quantity, additions and discounts). Arithemetic checking, however, often costs more than it is worth. Most suppliers double-check their invoices before issue, so errors are rare. Some firms check only handwritten invoices, invoices from new suppliers and a random sample of the rest.

- (v) ensure that the invoice has not been paid before. Double payment may easily be made on different copies of the same invoice, or both invoices and statement, or on repeat invoices such as hire purchase or contract instalments, unless all documents are presented at the time of payment, and clearly cancelled or stamped "Paid" when the cheque is signed.
- (vi) is the invoice charged to the correct account? (Strictly, this need not hold up payment, since the distribution of debits is a separate operation)

These six checks may conveniently be listed in a cage rubber-stamped onto the face of the invoice. The person responsible for each check initials against it, so that the cheque signatory can see that all checks have been made. The signatory must then ensure that the amount and payee correspond with the invoices, etc. attached.

Some firms enter all invoices onto standard payment vouchers. All invoices for payment at one time to a single supplier are listed and totalled on the voucher. The design of the voucher provides spaces for each check to be made, and the account to be charged. The voucher is sent as a remittance advice with the cheque; a copy is retained for posting. The voucher can also be designed so as to incorporate a cheque form. This usually is the lower half of the voucher, which is perforated so that the supplier can detach the cheque and bank it.

Where a number of invoices are to be settled in a single payment, they may be checked onto the supplier's statement, which is then returned with the cheque, or they may be listed onto a voucher or remittance advice. The advantage of the latter is that advices are built up during the month; this avoids checking suppliers' statements at end-of-month peak periods (suppliers' statements can be ignored altogether).

Where most payments are made for single invoices, remittance advices are unnecessary – compliments slips are cheaper.

Cheques may be written simultaneously with the cash payments sheet (or credit side of the cash book) using carbon paper. A pegboard, dual feed typewriter or accounting machine ensures correct alignment. An accounting machine will also accumulate the total of each batch. Banks require that the rupee amount be also shown in words, since they may be liable on a forgery, but cents can usually be shown in figures.

Some firms use cheque-signing machines or even presigned cheque. Naturally strict controls must be imposed on their use. Their advantage is that they save expensive cheque-signing time (which in practice is often an unpopular chore and negligently performed).

Another way of avoiding extensive cheque writing is the Giro transfer service offered by some banks. Suppliers and their bank accounts are listed and a cheque drawn in favour of the paying firm's bank for the total. The firm takes the list and cheque to its bank, at the same time advising the suppliers that their accounts are about to be credited

directly. The bank instructs its branches to credit the suppliers' accounts. At present this service can only be used for payees who have accounts with branches of the payer's bank, and a charge is made by the bank. If payees' accounts are with other banks who have not joined the Giro system, individual cheques are still necessary. (A similar service is widely used for salary payments).

The Giro transfer service is also useful for making payments to outstation branches e.g. for cash imprests, since the branch gets the money credited much earlier. With the cheque system, a cheque is sent to the branch through the post. The branch deposits it at the local bank. The local bank returns it to its Head Office in Colombo, again by post. Head Office debits the amount to the drawer's account and advises its branch (by post) that the cheque has been met. The branch then advises the payee that the amount has been credited to his account, and only then (after about 10 days) can the payee draw the cash. The Giro system eliminates two movements by post out of three.

Another time-saving device is the banker's order, by which regular payments of constant amount to a constant payee (e.g. rent, interest, hire purchase instalments, subscriptions) are made by the payer's bank according to instructions, and debited directly to the payer's account.

For cheque payments by post, envelope addressing may be mechanised by using a single print addressing machine (if the volume justifies the expenditure).

It is not necessary to pay all invoices at the end of the month. "Cycle paying" may be used to even out peak workloads, i.e. pay all suppliers with names beginning A - F in the first week; G - L in week 2, and so on. If suppliers do not require payment before the end of the month, cheques may be post-dated.

Post invoices, etc. to ledger accounts

It is not usually necessary to kept a bought ledger (creditors ledger) since unpaid invoices (or vouchers) can be kept separately from "paid" documents (the slip system). Where invoices are paid regularly every month, it is a waste of time to open a personal account, post invoices to the credit side, post the cheque payment to the debit side, and rule off.

A control account is always kept where the number of creditors is considerable. Note that physical control over suppliers' invoices is not so vital to internal control as with sales invoices, since if an invoice is mislaid the supplier will certainly send another.

It is not usually necessary to have separate procedures or ledger accounts for cash purchases and credit purchases, since they can all be posted together to the respective expense accounts. Cash purchases may be credited to the creditors control account and payments for cash purchases debited in the same way as credit purchases, since this does not affect the balance on the control account. ("Cash purchases" here means purchases for which payment is made by cheque on or before

delivery. Petty Cash purchases are a separate procedure, since it is uneconomic to issue cheques for large numbers of small purchases).

The bought ledger can easily be dispensed with but auditors will usually insist on retaining the general (or nominal) ledger, to which purchase invoices must be debited. This is basically a sorting and re-writing operation, and as with sales invoices, there are various methods. One method of avoiding re-writing is to enter the invoice directly onto the relevant ledger card, with an entry being made simultaneously by carbon paper onto a proof sheet at the back. The proof sheet is then the purchases day book, and the batch total is agreed with the pre-list before posting to a creditors control account. Alternatively invoices can be entered in a columnar analysis book (though this is very wasteful of paper). Column totals are posted to the ledger at regular intervals. If invoices are unit documents, i.e. each invoice is to be posted to one account only, they can be physically sorted, then add – listed and posted in total without any form of daybook. In this case, invoices must be kept filed by nominal ledger account, not by supplier, so that the accounts can be audited. Where the volume is high, one-at-a-time entry in a register or daybook, followed by one-at-a-time posting to the general ledger, should be avoided.

If an invoice includes a number of items on which an overall discount is given, often it is sufficiently accurate to allocate the whole of the discount to one large item, rather than waste time dividing it over all items.

Bank reconciliation

Reconciling payments per the Cash Payments Sheets or Cash Book with the debits on the bank statements is more difficult than reconciling receipts since the time taken by payees in depositing their cheques varies considerably. This can be avoided of course by the Giro or other transfer system in which the debits are made immediately, but this has the disadvantage that less cash is available for investment or alternatively that an overdraft is increased earlier than otherwise.

Time may be saved by ticking off cheque *numbers* (not amounts) in the bank statements, since the object of the exercise is to list only the outstanding cheques, and agree the balance in total.

The reconciliation should be made by a person independent of the cashier, and this person should receive the bank statements and certificates direct to avoid any chance of forgery (Copies of certificates will also be sent directly to the auditors).

8.20 TIME-KEEPING AND PAYROLL PROCEDURE

This comprises

- (i) recording standing information on employees.
- (ii) recording attendance of each employee.
- (iii) recording time spent in each cost centre or on each cost unit.
- (iv) preparation of payroll, pay envelopes, payslips etc. and payment of wages/salaries.

- (v) wage and salary analysis.
- (vi) management reports on idle time, absenteeism, labour turnover and efficiency of productive time.

Standing information on employees may be recorded on cards, loose leaf sheets or other convenient form, one for each employee. The information that it is necessary or useful to record varies from one firm to another but normally includes name, personnel number ("clock number"), male or female, nationality, race, date of birth, next of kin, married or single, date started employment, department, position, permanent or temporary, transfers, wage or salary rates and increments, medical examinations, tests, annual leave, sick leave and pension rights. On leaving the firm, the date and reason for leaving would be entered and the card transferred to a file of ex-employees.

Where a large amount of personal information frequently has to be searched for employees with particular characteristics, needlo sort cards are often used. These are cards in which regularly spaced holes are punched into slots to represent particular data or characteristics, e.g. a slot in a particular position may denote permanent staff, absence of a slot would denote temporary staff. There are two basic methods – edge punched cards and centre punched cards. Both are manual systems. Cards having the required characteristics are sorted out by inserting a needle through each hole and tipping up the cards. Where holes have been made into slots, the cards fall. With edge-punched cards they fall right out. With centre-punched cards their fall is only the length of the slot, but they can then be separated. This is repeated for each slot – characteristic.

Recording attendance

Time recording clocks are in widespread use, except in very small firms that stick to manually written registers. A few firms in which personnel management is of a high order have succeeded in dispensing with time records altogether, preferring to leave this as a part of supervisory discipline.

The commonest type of clock automatically prints the time when an employee inserts his card. Late arrival or early departure is printed in red. The card is then replaced in a wall rack alongside the clock. At the end of the week the payroll department collects the cards and calculates for each employee the total ordinary time, overtime etc. The typical card has space to enter total hours, rates of pay, gross pay, deductions and net pay. This is done by hand.

Recording time spent in each cost centre

In a job costing system it is necessary to record the hours of direct labour incurred on each job, so that the job can be correctly charged with direct wages. Similarly in a process costing system, the time spent by each employee directly on each process must be recorded. Indirect labour must be allocated to the respective overhead accounts – production, administration, selling, distribution, research, etc.

If an employee spends all his time on one job or process or overhead department, there is no time recording problem. But where employees move from one cost centre or cost unit to another, it is necessary to record the time of finishing one and starting the next. This may be on a time sheet or book kept by the worker or his supervisor, in which the start and finish times of each job are shown throughout the day, week or month. A variant of this is the clippertype time card used on a special time recording clock which is not confined to normal In and Out times. Cost centre codes are written alongside the printed times.

The alternative to having one card per employee is to have one card per job or batch. This is used where one job is worked on by a large number of employees. Each employee (or the foreman on his behalf) records his personnel number and the time he starts and finishes on the job. The card is used also to record materials issues and overhead approtionments, i.e. it amounts to a complete costing of a single job. Cards are attached to the physical work as it progresses through the various operations and departments.

In mechanised production control systems the job is broken up into operations, and a job ticket is issued for each separate operation. ("Operation ticket" would be a more logical name). As each operation is completed the job ticket is returned to the production progress control office, bearing the operative's personnel number, and the time started and finished. Where an incentive pay system is used, the job ticket shows also the output details on which pay is calculated. In punched card systems the job ticket is a dual purpose punched card. Entries are handwritten on the card, then punched in by punch operators.

Preparation of payroll, etc.

Three basic methods are as follows:

(i) Pegboard

Three records are handwritten simultaneously by carbon paper, viz. from front to back, employee's pay record card, payroll, and payslip. Each employee's pay record card is placed on the pegboard in turn, and the details of hours, rates of pay, gross wages, deductions, and net wages are entered. The payroll records all employees' details one line per employee. The payslip sheet is a duplicate of the payroll and can be perforated into separate slips. From each employee's payslip the correct money is made up and placed in a pay envelope, along with the payslip.

(ii) Accounting machine

When there are more than about 500 employees, the manual preparation of a payroll, which includes a large amount of cross adding and deducting, becomes very onerous. The accounting machine offers the advantages of automatic and accurate arithmetic, as well as avoidance of duplication. Because the arithmetic is accurate, no time is lost in extensive checking, and the payroll may be completed sooner.

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A few accounting machines can multiply hours and rates of pay to get gross wages, but this is not usually preferred; it is more economic to use a ready reckoner or desk calculator and to enter gross wages on the clock cards or time sheets as a separate operation before starting the payroll run.

Accounting machines are also available with a full typewriter keyboard, which can be used for entering names of employees. However, this is an expensive feature. It is often better to enter names by an addressing machine (if this is already owned) or duplicator or typewriter, as a separate preliminary operation, and to use a numerical keyboard machine.

The basic procedure is to enter each employee's pay record card in turn, taking duplicate carbon entries on to a backing payroll and payslip sheet. The pay record card is fed into the front feed of the machine while the payroll and payslips are locked into the back feed and move up one line for each employee. Entries are often double or triple spaced so that the payslip sheet can easily be perforated or guillotined into separate slips.

The machine should have at least two registers, one for adding basic wages, overtime, premium, bonus, etc. and deducting tax, employee's provident fund and other deductions to get the net wages, and the second to accumulate net wages. Additional registers may be used for proof totals and for accumulating the totals of gross wages and deduction columns.

Machines can also repeat print. This means that documents are entered side by side in the machine instead of collated together with carbons, e.g. the net pay printed on the payroll may be repeated on a pay envelope inserted to the right of the payroll.

The operator has to pick up from the employee's pay record card the gross pay to date, tax deducted to date, etc. There are various methods of proving accurate pick up such as the check total method. For details see a textbook such as "Introduction to Mechanized Accounts and Computers" by A. F. Linton.

Steps in a typical payroll procedure by accounting machine are as follows:

- (1) Multiply hours worked by rate per hour and enter gross wages, including overtime, on employees' time cards.
- (2) Add list gross wages.
- (3) Print employees' names and numbers on payroll and pay slips by addressing machine.
- (4) Insert payroll and pay slips into the back feed of the machine with carbon paper, and employees' pay record cards in the front feed.

(i) enter gross wages for the week;

(ii) pick up cumulative gross wages to the end of last week per the card (the machine automatically calculates and prints gross wages to date);

(iii) enter tax due to date;

(iv) pick up tax paid to the end of last week per card (the machine automatically deducts this from tax due to date and prints the tax due or refundable in the week);

(v) enter standard deductions (machine automatically deducts these and the tax from gross wages, and prints the net wage).

The back feed moves up a line for each employee entry.

- (5) After all employees are posted, the machine prints total gross wages, total tax, and the total of each other deduction, and total net wages. These are agreed together, and total gross wages is agreed with the pre-list.
- (6) Analyse the net wage column to determine the note and coin requirements, and draw the exact amount from the bank.
- (7) For each employee make up pay and insert in window envelope with folded pay slip so that the name shows. Seal envelopes only after all are filled.
- (8) Post totals to wages, tax, E.P.F. and all other accounts affected.
- N.B. The distribution of wages to cost centres can be made on a separate machine run.

(iii) Punched Cards

A punched card installation which includes punches, verifiers, sorter, tabulator, summary punch, collator and multiplying punch, may be used as follows to prepare a payroll:

- (1) For each employee punch a card containing his name, number, rate of pay, and standard deductions. This file of cards is kept up-to-date for all new employees, leavers and changes in pay rates or deductions.
- (2) Wages are calculated either on a time basis or a production basis or both. Hours and/or quantities may be written on job tickets, time sheets, etc. in the form of dual purpose punched cards, which may be batched daily or weekly, and the written data punched in.
- (3) Verify above.
- (4) Where there are several job tickets for one employee, these should be sorted by employee and tabulated to get the total hours or quantities on which gross wages may be calculated. Cards may be punched with totals automatically by a summary punch, linked to the tabulator.
- (5) Employee cards are collated with total hours cards, then put through a multiplying punch, which multiplies hours at the appropriate rates, and punches gross wages in the total card.

- (6) Employee cards, balance cards (from last month) and total cards are then tabulated to produce the payroll, pay slips and (through the summary card punch) new balance cards containing cumulative pay to date, cumulative tax, etc. for use in the next payroll run. All column totals are printed at the end of the payroll. Gross wages should be agreed with the total from operation (5), and net wages should equal gross wages less deductions. The rest of the procedure is as before. The total cards may then be resorted into the different cost centres, and tabulated as a wage and salary analysis.
- N.B. This procedure is a simplified illustration only. Payroll procedures vary widely depending on the type of work, the number of each category of employees and the kind of details required to be printed.

In all payroll procedures, the most important internal control is to separate the payroll preparation from making up pay packets, handing over pay packets, holding unclaimed pay packets, or any other custody of pay money. Secondly, everything entered on the payroll should be independently checked to prevent such frauds as inclusion of dummy employees, continuation of employees who have left, or over-statement of overtime hours or rates of pay (in collusion with the recipient).

Where the employee is required to give a receipt for his pay, this may conveniently be made a detachable stub on the payslip or an additional column on the payroll which the employee signs after he has checked his pay.

Many firms have found the advantages of paying wages and salaries by direct credit to employee's bank accounts (when they have bank accounts). Some banks operate a giro system under which accounts in their own branches are credited from a list prepared by the employing firm. This list can be a copy of the payroll, but must of course include details of each employee's bank account. The firm makes out a single cheque to its own bank for the total net pay.

Where wages are paid in cash, a lot of time is spent making up individual payments. Time can be saved if each person is paid to the nearest rupee, or to the nearest currency note, to avoid counting large amounts of small change. The employee does not gain or lose since the over or under payment is shown in his payslip and is carried forward on a cumulative basis. Corrections can be made if the cumulative figure goes beyond a tolerable limit. This also speeds up the procedure where time is an important factor.

Static information such as employee's names, numbers, rates of pay and standard deductions from pay, have to be written every week on the payroll and pay slip, and sometimes on pay envelopes, time cards, etc.

This is made much easier by an addressing machine, which can pre-print all standard details from embossed plates (or from stencils prepared on a typewriter). Selected details can be masked e.g. the

rate of pay would not be printed when the pay envelopes are put through the machine. One plate or stencil is prepared for each employee. Each week the alterations to the payroll, such as new employees, employees who have left, and changes in rates of pay and deductions, are sent to the addressing machine section. New plates are prepared, and old plates withdrawn or altered as necessary. The file of plates is controlled by agreeing the total of all weekly rates of pay with the previous week's total. For instance, if the total of all weekly rates of pay for the entire labour force (sometimes called the "going rate") is Rs. 21,800 and 10 workers have joined, adding Rs. 1000/week, and 4 have left, lightening the payroll by Rs. 600/ week, the new going rate obtained by adding up the rate of pay column on the printed payroll should be Rs. 22,200. (This will not be the same as the total basic wage since the latter includes fractions of a week's pay for employees joining or leaving during the week).

Wage and Salary Analysis

Wages and salaries have to be analysed as far as possible to the cost centres which incurred the labour hours and got the benefit. Cost centres are usually departments, processes or jobs. When an employee works wholly in one department, process or job, there is no difficulty in ensuring that the whole of his pay is charged to that cost centre. Employees may be listed on the payroll in cost centre order, e.g. all employees working in A Production Department are listed first and their wages sub-totalled, then those in B Production Department, then Administration etc. This provides a ready made analysis of wages.

Employees whose time is chargeable to several cost centres, e.g. production jobs, must keep time records showing the time chargeable to each job.

These times must be multiplied out at individual rates of pay, or average departmental rates. Then gross wages must be analysed by any of the analysis methods described under sales analysis section 6.18. If individual job tickets are made, these can be physically sorted and add-listed. If individual job tickets are made into punched cards as described above, these can be very rapidly sorted and tabulated. But if documents are not unit media, i.e. one document includes more than one job or cost centre, sorting must be by slip-adding (see section on sales analysis) or some form of re-writing.

Management reports

In a punched card system, where all basic data has been entered into the cards, the data can be selectively sorted and tabulated in any desired arrangement or format. If, for instance, job cards include data on how non-productive time was spent (waiting for work, machine breakdown, personal, re-work etc.) this can easily be summarised and tabulated into an Idle Time Report.

In any system, management reports must be thought out in advance to ensure that the basic data required is being regularly recorded, and then sorted out and summarised into a report. For a labour turnover report, Personnel Department would keep statistics from the employees' record cards to show the number of separations (dismissals and leavers) each month or quarter, compared with the total number of employees. From the file of ex-employees, the separations would be analysed by cause (e.g. death, retirement, marriage, leaving to higher paid job, dismissal for theft, inefficiency, etc.).

For a report on the efficiency of productive time, job time records must show standard times as well as actual times. These can then be summarised by job or department or other cost centre.

8.21 COSTING AND STORES ACCOUNTING

Previous procedures have included the credit to finished goods stock accounts and the debit to cost of sales account from the stock requisition or despatch note (8.18), the debit to stock (finished goods, or raw materials, or consumable stores) and credit to cash or creditors from goods received notes or suppliers' invoice (8.19), the debit to nominal ledger expense accounts from expense invoices directly or via an analysis daybook (8.19), and the distribution of wages and salaries to the respective cost centres from some form of wages and salaries analysis (8.20).

This leaves the following costing and stores accounting operations, which would apply to any manufacturing or service organisation:

- (i) charging cost centres with raw materials and consumable stores issued to them;
- (ii) verifying physical stock and adjusting stock records;
- (iii) apportioning indirect expenses (overheads) to cost centres;
- (iv) transferring the cost of finished production from work in progress to finished goods stock accounts;
- (v) reporting production costs and quantities periodically;
- (vi) comparing production costs and quantities with budget or standard, and analysing and reporting variances;
- (vii) maintaining records of fixed assets, maintenance, depreciation etc.

Production planning and control procedures are outside the scope of this work, but they should be arranged so that costing and stores accounting requirements are met without duplication of paperwork.

Charging materials to cost centres

The usual basis is that departments requiring materials make out materials requisitions (stores requisitions). The storekeeper is allowed to issue stores only on production of a requisition duly authorised by the department manager responsible. Periodically, requisitions are sorted and summarised so that accounts in the stores ledger may be credited and cost centres debited.

This procedure is intended:

- (i) to provide a moral and physical check on pilferage and other losses by comparing actual stock of each item with the book balance after crediting issues;
- (ii) to provide an accurate record of costs incurred by each cost centre;
 - (iii) to indicate when further supplies should be ordered.

However, this is often an unnecessarily elaborate and costly procedure. It should be critically examined to see how the volume of paperwork can be reduced and the store-keeper's time released for more productive work (such as review of obsolete, slow-moving and damaged stocks, standardisation, and value analysis, in liaison with other functions affected). Experience may show that many items (but not all) do not get lost or stolen, being heavy, or otherwise unattractive to pilferers. If they are also of low value compared with other elements of cost, it is not worth recording individual issues and checking balances in hand (particularly as "differences" often turn out to be due to clerical errors or faulty cut-off procedures). These items should be written off at the time of purchase in the same way as small stationery items. Issues should then be on demand, without requisitions. The clerical savings will often be substantial. However, purchases should be watched for a period thereafter to endure that there is no significant increase on the previous level.

If stock levels are high, purchases may be very different from actual usage in an accounting period. In this case, stock may be approximately valued at the beginning and end of the period, and debited and credited respectively to purchases to convert the latter to usage.

Orders should be made when the balance of an item falls below the re-order level, which may be marked on a shelf or wall behind the goods, or indicated by a divider card inserted among them. This method of re-ordering is safer than referring to running accounts, since account balances may contain errors, and are inevitably out-of-date.

Requisitions should continue to be required for stock items which are subject to preventible loss, or which have a significant effect on the aggregate costs of any cost centre. A requisition should be made in two copies, and the requisitioner should enter the number of items requested if he suspects that unauthorised additions may be made. Some firms require a separate requisition to be made for each stock item so as to facilitate sorting and posting. It will be appreciated that each item has to be sorted twice, once by stores code number, and once by cost centre (or job) number and that if requisitions are unit media they can be physically sorted and add-listed.

Before add-listing, requisitions must be priced. This is usually the job of the costing section which maintains the stores ledger. The store-keeper's copies of requisitions are batched at least weekly and sent to the costing section. Materials may be priced on the FIFO, weighted average, specific or standard price methods. (LIFO or "last price" methods may not be acceptable to the auditor). Of the approved methods, standard price is by far the simplest to operate, but if this is adopted, it is important to test the effect of accumulated price variances on product costs from time to time.

Where materials carry price tags at the time of purchase, the specific price method is easy to operate. Price tags are left on the items in store. On issue the store-keeper enters the price on the requisition. (It is not worth creating tags as a separate operation, however).

When requisitions have been priced, quantities and values are posted to the respective accounts in the stores ledger (credits) and to the job ledger and cost centres ledger (debit). This posting operation may be done by hand or by accounting machine or punched cards or computer. In accounting machine systems old stock balances are picked up, and new balances calculated and printed. This is a similar procedure to posting a sales ledger, except that both quantities and values have to be posted.

An accounting machine can also be used to compare the balance in hand of each item with the re-order level. After posting the requisitions, the balance in hand is printed as a sub-total. Then the re-order level shown at the head of the account is deducted, and the answer printed on the proof sheet. If this is negative it is printed in red, thus highlighting the need to re-order that item. Stock records are usually kept on cards filed in boxes or trays, or loose leaf sheets in a binder (See section on filing systems).

Verifying physical stock and adjusting stock records

All items should be subjected to independent physical check, which includes a check of quality as well as quantity. Special note should be taken of stock that is found to be damaged, substandard, obsolete or surplus to planned needs, so that it may be suitably disposed of. This requires expert appraisal, not just mechanical counting, i.e. stock checkers should be trained for the job.

Stock items should be checked at irregular intervals throughout the year, a few items at each visit, so that every item is checked at least once during the year. This is better than a single end-of-year stock check for the following reasons:

- (i) the work load is spread evenly throughout the year, and can be better planned;
- (ii) it is possible to have a small permanent staff of stock checkers who can be trained for the job; this is more efficient than drawing untrained personnel from their regular jobs at the end of the year;
- (iii) it is not necessary to close down the stores or disrupt production or lose sales;

- (iv) continuous stock-taking reveals shortages sooner and has a higher deterrent effect on pilferage;
- (v) time can be saved by checking items when their balances are low.

Continuous stock-taking as described above is often miscalled "perpetual inventory". Strictly the latter means only that stock records (one account record for each stock item) are kept continuously up-to-date. Continuous stock records do not necessarily imply continuous stocktaking, but the two methods are often recommended together (instead of end-of-year stock accrual, and end-of-year stocktaking).

All items should be physically verified in this way, and balances compared with the balances shown in the stock records. The comparison must of course be made after all goods received notes and requisitions up to the date of verification have been posted to the records.

If records are not kept for small-value items, it may still be worth examining balances in hand to ensure that they are not damaged, substandard, obsolete or in excess of needs (compared with rate of usage).

Shortages and surpluses should be credited and debited in the appropriate accounts and transferred to a separate account(s) for investigation. Stock accounts should not be left showing incorrect balances (the correct balance is the *physical* balance), especially where items are ordered or committed by reference to the stock account balances.

Stock records should not be unnecessarily duplicated. One set of records may be kept by the costing section, or by production control to provide for all requirements viz. production control require quantity information on the balances in hand, on order and committed, and rate of usage, while accounts and audit require also value information on issues and stock in hand.

If stock records are kept independently of the storekeeper (as they should be), it is not necessary for the storekeeper to keep a further set of records. Bin cards do not provide any information that is not already available. If the storekeeper is responsible for raising purchase requisitions then he may keep bin cards, but these need not show more than item description and re-order level. If bin cards are attached to bins, no bin number is necessary either.

Apportioning overheads to cost centres

Costs which are directly attributable to production cost centres are charged to those cost centres, e.g., material issued to job x 123 is debited to the account for x 123 in the job ledger using the stores requisition as a posting medium.

Costs which are not directly attributable to individual production cost centres are charged to the relevant overhead cost centres and then (in a full cost system) apportioned to production cost centres on a suitable basis such as labour hour rate or machine hour rate.

The more cost items that can be directly attributed to production cost centres, the more accurate product costs will be, but on the other hand the costing system will be more elaborate, more costly and take longer to produce management information. As always, a balance must be struck between the cash value of more accurate product costs provided at a given time and the cash costs of providing that extra accuracy.

In a job costing system in which production overheads are absorbed by a labour hour rate, each job card is debited with the appropriate overhead found by multiplying direct labour hours shown on the card by the hourly rate. The total overhead thus absorbed may be found from the total direct labour hours shown on the Labour Analysis multiplied by the hourly rate. The total is debited to the Job Ledger Control account and credited to the Production Overhead cost centre. Job card balances must then be agreed to the balance on the Job Ledger Control account.

If direct materials and direct labour are posted to job cards by accounting machines, it may be convenient to charge overhead at the same time as labour by a combined hourly rate. Most accounting machines, however, do not multiply; this operation must be performed on the posting media before starting the posting run.

It has been assumed above that all indirect costs (materials, labour and expense) are charged to one of four overhead cost centres – production, selling, distribution, and administration, and that production overheads are apportioned and re-charged to individual production cost centres. The structure of cost centres in a large organisation may be much more elaborate. For instance, costs may be collected first by department or group of departments and then re-charged each on a suitable basis to production, selling, distribution and administration. Finally the total charged to production is re-charged to individual production cost centres as before. This sort of analysis is facilitated by a well-designed sheet showing departments down the left hand side and cost centres across the sheet, one column for each cost centre. An example is shown in Buyers and Holmes Principles of Cost Accountancy, 3rd edition, page 232.

It may be asked whether it is actually necessary to apportion overheads to production cost centres. Most overheads are fixed costs, so unit product costs increase when the volume of production falls, and vice versa. This makes it more difficult to distinguish a genuine increase in costs on which action should be taken from an apparent increase due to low production. If the volume of production fluctuates, it may be better not to apportion overheads (except as an ad hoc exercise, e.g. for pricing purposes), and to control overhead costs by comparing their absolute amounts with budget or standard. This improves control, and also considerably simplifies the costing system. On the other hand, management may be used to full product costs and unable to appreciate the control advantages of separating direct and indirect costs. (The

above method is called "direct costing" and is similar to marginal costing, which separates variable and fixed costs).

Transfer cost of finished production from work in progress to finished stock

In a job costing system, the job card records and accumulates all costs charged to the job. When the job is complete, the job card is signed by the inspection foreman to indicate that the job is up to standard, and the finished goods store-keeper signs indicating that he has taken over the item. The total cost must then be transferred from the job card to the finished goods stock ledger. This operation may be manual or made by accounting machine. The total of all such transfers for a period is credited to Work in Progress Control account and debited to Finished Goods Stock Control account.

In a process costing system, there is an account for each process, which is debited with direct materials, direct labour, and overhead in the same way as jobs. Records are kept of finished production each period. Production has to be credited to the relevant process account at cost, and debited to Finished Goods Stock account.

Cost may be ascertained on a FIFO basis where earlier material is completed before material introduced later, and on a weighted average basis where earlier and later materials are mixes so that it is not possible to identify the source of finished production.

In either job costing or process costing, only production that meets the quality standards is transferred to finished goods stock. The cost of this production includes normal wastage of material, labour etc. Abnormal wastage, on the other hand, is usually separately costed and charged to a separate account for investigation. In a job costing system, production that is not up to standard is labelled "Reject" and the accounting entries are made from copies of the reject labels.

In an organization providing a service, there is, of course, no finished goods stock account. The cost of services provided is credited to Work in Progress and debited to Cost of Sales, from service records. Work in Progress account may be replaced by an operating account where services are of a short term nature, i.e. where costs and revenue coincide.

Reporting production costs etc.

A standard set of reports should be developed, including addresses and dates of submission based on the *regular* information needs of managers. Special needs should be met by special ad hoc reports.

Regular reports would normally include production quantities, costs and unit costs, actual, standard (or budget), and variance (analysed as far as is useful). Where the level of scrap is a significant influence on total costs, a scrap report would be prepared, showing the total serpa analysed by cause. For any element of cost which is significant in the total production cost or for which the unit cost varies controllably, a supplementary report would give further details and reasons for variances.

These reports would be compiled by the cost or management accountant from the accounts, which should be kept so as to facilitate the extraction of information.

Fixed assets and maintenance records

A loose leaf or card asset register is usually kept to record details of fixed assets owned by the firm as described in section 6.11.

New purchased assets should be entered from purchase invoices. Assets constructed by the firm will be entered at cost from the capital project record.

It is equally important to extract assets which are sold, scrapped or otherwise disposed of by the firm. Particulars are recorded on a standard asset disposal form for authorisation and posting.

If assets are frequently transferred from one location to another, or from the charge of one person to another, an asset transfer form should be designed to record the transfer, and from which detailed are posted to the asset register.

8.22 BOOKS OF ACCOUNTS AND FINANCIAL STATEMENTS

Books of account are the accountant's working tools. Their design deserves as much thought as any other tools. Too often books are simply re-ordered from year to year without any thought whether they are most conveniently designed for entering or extracting information. As a general rule, books should be reviewed at least once every three years to ensure that their size, cover, page format etc. are still best for their purpose.

The modern tendency is to replace bound books (especially ledgers) by loose leaf records. These meet the requirements of the law, and have the following advantages:

- (i) when a page is full, a new page can be inserted behind it thus keeping accounts in their logical order; in a bound ledger the account often has to be continued elsewhere for lack of space, thus losing any original order, and slowing down entries and references;
- (ii) after audit pages can be removed to a separate binder, thus reducing the size of the ledger; in a bound book current accounts become lost amongst a growing number of dead accounts. One internal control requirement is that someone responsible should hold blank ledger sheets (the same sort of control as is put on cheque books and other "accountable documents") and, preferably, enter the account heading on issue.

Loose leaf records such as ledger accounts may be on paper or cards. Paper is usually high quality rag paper (which lasts as long as cards) and may be held securely in various forms of hand cover or binder. This is usually cheaper and better than card records (See section 8.23 on filing systems).

Loose leaf stationery (or bound books) can be printed to order in any size, ruling or format. It is worth consulting a good stationer as to the costs of different designs; a non-standard design may sometimes cost more but yield dividends in clerical savings.

The traditional T – account form of ledger account has been superseded by a columnar form for use in machine accounting systems. The columnar form is also better in handwritten systems. Compare the following account forms:

TRADITIONAL 'T' ACCOUNT

J. Perera, 14, Station Road, Matale.

Date	Details	Folio	Amount	Date	Details	Folio	Amount
1970 11 Feb 26 ,, 31 ,,	To Returns ,, Cash "Balance	PBR 4 CB 41 c/d		197 0 9 Feb 11 ,, 16 ,, 22 ,, 29 ,,	By Purchases """ """ """ """ """ """	PDB 31 32 35 37 40	437.50 27.50 510 00 470.00 325.80
			1770.80	1 March	By Balance	b/d	1770.80 795.80

MODERN COLUMNAR ACCOUNT

Name: J. Perera

Address: 14, Station Road, Matale

Date	REF	Debit	Credit	Balance
9 Feb 70 11 ", ", 11 ", ", 16 ", ", 22 ", ", 26 ", ", 29 ", ",	GDS 2731 GDS 2739 RET 484 GDS 2870 GDS 2950 GSH 5147 GDS 3122	30.00 945.00 975.00	437.50 27.50 510.00 470.00 325.80 1770.80	

N. B. The references here are to the original source documents which are posted directly to the ledger. These are available for any further details required.

In this handwritten columnar account the balance can be calculated without any pencil sums in the margin. Also it is written once only. Eight columns in the "T" account are reduced to five, thus making the ledger narrower, easier to point, and cheaper.

In an accounting machine system, it would not be necessary to print the horizontal and vertical guidelines. Also the machine would calculate and print the balance after every entry, or after a set of entries made at the same time.

The *order* of accounts in the ledger should normally be in the same sequence as they would be extracted and entered in regular financial statements. This should correspond with the code number sequence.

Financial accounts are also "management information reports" and the same comments apply as in section 6.21. These accounts comprise trading, manufacturing or operating accounts, profit and loss and appropriation accounts, balance sheets and flow of founds statements. Many firms now prepare interim account's not just yearly and half-yearly to support dividend payments, but quarterly and even monthly for progress review at top management meetings.

Where there is a large number of accounts of the same type, it is advisable to replace them by control accounts. This eases the extraction of a trial balance.

For interim accounts it is essential to have continuous stock records. The book balance shown may be taken as the cost of actual stock in hand, provided there is a systematic programme of checking physical stock, and transferring out differences. Any stock losses which are not known to be recoverable (e.g. from the officer responsible or on an insurance policy) at the time of preparing the accounts should be written off for the purpose of the interim account, and the entry reversed in the following period.

Normally there are more account headings in the ledgers and trial balance than need to be shown in the finished accounts, e.g. different types of debtor and prepayment accounts may be combined. The Trial Balance may be pre-printed so that such accounts are grouped together and may conveniently be sub-toalled. Adjustments should be made in columns to the right of the Trial Balance so that the adjusted figures may be extended into Profit and Loss account columns and Balance Sheet columns. This "spread sheet" method of preparing interim or final accounts ensures that no item is overlooked.

N.B. It is not necessary to duplicate the adjustments as formal journal entries. The postings may be made directly from the working sheet which is authorised and filed as a journal voucher.

8.23 MACHINES AND EQUIPMENT USED IN ACCOUNTING PROCEDURES

The various types of machine or device commonly used in accounting systems and procedures are described here. Appendix 2 gives detail

of medels obtainable in Ceylon and their prices at the time of a survey made in 1969, and Appendix 3 defines terms commonly used in mechanised accounting and computers.

(i) Adding and Add-listing machines

An adding machine adds and subtracts amounts entered on the keyboard, and shows the total on a row of dials. An add-listing machine also adds and subtracts, but prints each amount and sub-totals and totals on a narrow roll of paper called a tally roll. An add-lister should be preferred where a permanent record of items is required, e.g. for pre-listing invoices. Where this is not required, an adding machine is faster.

Machines may be operated manually, by cranking a handle, or electrically, by pressing a motor bar. The latter is faster, especially where the machine is used intensively, since operator fatigue is reduced. At least one manufacturer offers an electric machine which can also be operated by hand, e.g. in the event of a power failure.

There are two types of keyboard – the ten key or simplified keyboard and the full keyboard. The ten-keyboard contains only 10 keys carrying the digits 0 – 9, and control keys. A number is set up by pressing the keys in the order in which the digits appear in the number. In the full keyboard, on the other hand, there is a key for each digit in each position, up to the capacity of the machine. Ordinary clerks can enter data into the ten-keyboard faster, but a trained operator can get more work from a full keyboard machine, as digits can be entered simultaneusly.

Adding and add-listing machines can usually be justified in any office in which there is a considerable amount of addition and subtraction. At a cost of about Rs. 1,000/- and a life of at least 10 years, the depreciation is only Rs. 100/year. The machine is worthwhile if it saves more than Rs. 100/- year in clerical time, say one third of one clerk. However there is a danger that it will be used even for small sums that could more quickly be done by hand.

Add-listing machines may also be obtained with movable carriage (as in a typewriter). This enormously extends the machine's possibilities. For instance, ledger accounts can be posted, each item in its correct column, debit and credit, and new balances extracted and printed. If the machine has a duplex register, i.e. two separate accumulating mechanisms, one can be used for calculating individual account balances, and the other for accumulating the total of all postings for comparison against a control total. Most machines have a "non-add" key so that for example, reference numbers can be printed against amounts without being added in. Another feature of some machines is the split platen. This enables the two sides of the carriage to be moved up and down independently, e.g. when two columns of figures of uneven length are required. Some add-listing machines can be fitted with a cash drawer, thus providing a cash register as and when required.

The main limitation of the add-listing machine and, in fact, the main difference between it and the full-fledged book-keeping machine (v)see below), is that it is confined to figures, except that keys may be provided by which certain standard descriptions may be printed, such as GDS, CHS, RET etc. This disadvantage is reduced by using printed forms and/or forms pre-printed by typewriter or addressing machine. See "Efficient Accounting Methods" by Howard F. Wilson, Chapter 16 for descriptions of how an add-listing machine may be used in invoicing, ledger posting, payments procedure and payroll, and the "Manual of Modern Business Equipment: Adding and Calculating Machines" for extracting a trial balance, preparing bank paying-in slips, pay slips and envelopes, and monthly statements.

(ii) Addressing Machines

Addressing machines are so-called because they were originally designed for reproducing names and addresses on newspaper wrappers. Nowadays, they are used for reproducing standing data of any kind. Applications include:

- (a) printing names of employees and their standard rates of pay and deductions onto paysheets, pay slips and envelopes, time sheets, job cards, etc,.
- (b) printing names and addresses of customers, delivery instructions etc. onto invoices, despatch notes, statements, sales catalogues and circulars:
- (c) printing descriptions of products which are sold in standard quantities onto invoices, stock lists etc;
- (d) printing names, addresses and bankers of shareholders onto dividend lists, dividend warrants, envelopes, notices of meetings.

In effect, the addressing machine is an office duplicator, but whereas an ordinary duplicator prints a large number of copies from a master which is usually used only once, an addressing machine prints only one or a few copies from a master which is used repeatedly. It can be seen from the above applications, the machine is best used where there is a large volume of data (employees, customers, products, shareholders) which is fairly constant from month to month. After altering the file of masters for changes during the month, the data can be reproduced far faster than they could be written or typed. It is estimated that copying out 1,000 names and addresses would take:

By hand		12	hours
By typewriter		0	hours
By manually-operated addressing mach	ine	2	hours
By electrically-operated addressing mac		8	minutes

There are 3 types of addressing machine based on the method of reproduction used:

(a) metal or plastic plates are embossed on a separate embossing machine. The raised characters print onto the forms through an inked ribbon. Plates are of various sizes, carrying from

five to nine of type. The largest gas a capacity of 414 characters. Alteration is by blanking out and re-embossing; plates can be re-embossed up to five times.

- (b) Stencils mounted in cardboard frames, may be prepared on an ordinary tyepwriter (a front feed attachment may be necessary). In the addressing machine ink is forced through the stencil onto the material to be printed as in the familiar stencil duplicators. Stencils can be altered by applying correcting fluid and re-typing. As with plates, the limit is about five corrections to the same of stencil. Stencils are cheaper than plates, and weigh much less, but do not last as long.
- (c) Spirit Masters are pieces of art paper which are typed with hectographic carbon at the back, then mounted in cardboard or plastic frames. When damped with spirit, an impression can be taken, as in the conventional hectographic spirit duplicators. Masters are cheap and are made afresh rather than altered. Also the addressing machine itself is cheap compared with the foregoing methods.

Features that are commonly available on all types of addressing machine are as follows:

- (a) Masking unwanted details on the master (plate, stencil or spirit master). For instance, rates of pay shown on employees' plates would be masked when heading up time sheets. This feature is also called "line selection". "ink-out pads", etc. This enables one master to be used for a variety of purposes.
- (b) Automatic Selection of masters. Where not all of the masters are to be printed, e.g. in preparing invoices, the required masters have to be pulled from the file. Alternatively, if most of the customers are to be invoiced, all the masters may be loaded into the machine, then unwanted customers are recognised as they come up and are skipped (not printed). Automatic selection can be used where masters can be categorised beforehand, e.g. customers may be categorised according to the products in which they are interested. These products are indicated on the masters by signal tabs, embossed notches, edge-punched holes or other means, which can be recognised by the machine which then prints only those categories required.
- (c) Automatic feed of the forms to the printing position, and from there to a receiving hopper, is standard on electrically operated machines, but is available also on hand machines.
- (d) Repeat print enables the operator to obtain as many copies as required from a single master.
- (e) Continuous stationery: Single sheets or multi-part sets of continuous stationery can be fed by a suitable attachment.

- (f) Additional information, not on the masters, may be printed on some machines, e.g. "If undelivered, return to XYZ Co. Ltd." may be added to all envelopes. There are also attachments for printing the date, for consecutive numbering of documents etc.
- (g) Listing items down a sheet of paper at the same time as forms are printed.

Addressing machines vary widely from small hand-operated single-print machines, occupying no more space than a telephone, to large floor-standing machines with a high degree of automatic and flexible operation. Speeds vary from 500 to 7,500 impressions per hour.

(iii) Analysis Machines

Analysis, that is, sorting data into pre-determined categories and accumulating the total of each category, can be performed to some extent by book-keeping machines and cash registers, and to any extent by punched card sorters and tabulators once the data has been punched into cards. Analysis machines are designed for analysing directly from original documents, e.g. sales invoices or memos may be analysed by department, or by product, by customer etc.

One type of analysis machine is a development from the book-keeping machine. It has 198 registers, i.e. items can be analysed over up to 198 separate heads, and totals obtained. In each register, items can be added or subtracted. This means that each register can be treated as a ledger account; amounts added are debits and amounts subtracted are credits. This is especially useful in constructing a set of accounts from incomplete records.

Another type is a development from the cash register. Items entered on the keyboard can be analysed over (usually) 27 categories. A tally roll records each entry, its reference number, and the number of the register into which it has been added. The operator can see the tally roll through a window, but cannot tamper with it.

These machines are expensive, and it is often more economic to use hand methods of sorting (see section 6.18).

(iv) Autographic and manifold registers

The autographic register or manifold register is very familiar in retail shops. This is a simple machine in which forms are aligned on a writing surface for manual entry, then cranked forward and torn off. Up to six copies of a form can be written using continuous stationery with interleaved carbon paper. One copy of the form always remains locked inside the machine. This is a valuable internal control. If the machine is used to write cash sales memos, for example, the proprietor can open the register at the end of the day and check that the total sales agrees with the total cash received.

A cash till can be added as a drawer below the register; the drawer is opened on cranking the handle. This is used where cashiering is decentralised to salesmen.

The autographic register is not limited to cash sales. It may be used wherever forms have to be made out in several copies by hand e.g. manual invoicing. For a price of about Rs. 500 the user gets the advantages of continuous stationery, viz. no insertion of carbons, automatic alignment, and no decollation (extraction) of carbons. There are also small portable registers for on-the-spot records.

(v) Book-keeping and Accounting Machines

The book-keeping machine, also called accounting machine or posting machine, is a combination of a typewriter with an adding machine having up to twenty registers. (If it has more than twenty registers it is usually classed as an analysis machine).

This combination of printing and adding/subtracting functions makes the machine very versatile. Common applications include:

- (i) posting copies of sales invoices to the sales ledger, at the same time creating monthly statements as carbon copies of the ledger accounts, and a proof list of postings which can serve as the sales day book.
- (ii) posting copies of cash receipts to sales ledger accounts and monthly statements, creating also two proof lists (bank paying-in-slip and receipts side of cash book).
 - (N.B. Sometimes the receipt itself is typed on the machine, and at the same time, a copy receipt for posting, a bank paying-in-slip and the receipts side of the cash book).
- (iii) posting purchase invoices to bought ledger, creating also remittance advice and proof sheet (purchases day book).
- (iv) typing cheques for signature, creating also a proof sheet (payments side of cash book).
- (v) posting payments per the cash book to the bought ledger.
- (vi) preparing employees' earning records, pay envelopes (if required) and two proof sheets one of which is perforated and can be separated into pay slips; the second proof sheet being the payroll.
- (vii) posting copies of stores requisition and goods received notes to the stores ledger.
- (viii) posting job tickets, stores requisitions and other source documents to the job or process ledger.
 - (ix) analysis of sales, purchases, stores issues etc. into as many categories as there are registers available on the machine.

There is also a variety of book-keeping machines which can multiply. An example of this is the *billing machine*, which is mainly used for billing or invoicing. This includes multiplying quantities and rates or prices, adding amounts, calculating and deducting discounts etc.

All book-keeping machines require loose leaf records which unlike bound books can be inserted into the machine. The various forms, accounts and stationery are usually designed specially to suit the machine system. For each job or application of the machine, the manufacturer provides a control unit (also called control bar, control panel, form bar, program bar). This unit in effect tells the machine exactly what to do. For instance in a sales posting application, the unit would cause the machine carriage to tabulate (move) across the account to pre-determined positions at pre-determined times, to enter in the appropriate register amounts keyed in by the operator, and at the right time and position to print the new balance on the account. As much as possible is "built in" to the machine; the operator has only to insert ledger cards, read and key in variable data and extract cards: the rest is automatic. When a job is completed it takes only a few records to change to the control unit for the next job.

In ledger-posting applications, the machine calculates the new balance from the opening balance as read and keyed in by the operator and the transactions for the period. The accuracy of the latter are proved by accumulating them in one of the machine registers. At the end of the batch the total in the register, called the "proof total", is printed on the proof sheet, and compared with the total of a pre-list prepared beforehand on an add-listing machine. This is known as batch control.

The other requirement is *pick-up proof* to ensure that the operator has correctly read and keyed in the opening balances. The most popular methods are as follows:

- (a) cipher proof means that the opening balance is picked up a second time after entering the current transactions, and deducted from the first pick up. If the operator has entered the same amount both times, the machine prints a cipher. Unless the same mistake is made twice, the balance must be right. This proof is applied to each line entry in turn.
- (b) in the direct proof method, the new balance is printed as a sub-total, then the operator keys in the opening balance a second time and deducts it from the sub-total. The result is printed on the proof sheet and should be the same as the amount of the transaction. This requires more scrutiny than the cipher proof method, but can be done on a simpler machine. Again it is a line-by-line proof.
- (c) in the double pick-up proof method, the operator picks up the old balance a second time, but accumulates it in a separate register. New balances and transactions are accumulated automatically in further registers. At the end of the posting run, the total of old balances, plus the total of transactions should equal the total of new balances. This method is faster than cipher proof or direct proof but requires more registers, and a higher standard of accuracy, since it is a batch control rather than a line-by-line control.

All book-keeping machines are electric, and all have the features of front and back feed i.e. the carriage is designed so that forms can be inserted in front of the platen (roller) without rotating it or disturbing forms already in the back feed (the latter being inserted as in a typewriter).

The main differences between machines lie in their keyboards, and in the numbers and type of registers. Three main types of keyboard are the alphabetical keyboard (as in a typewriter), the full adding machine keyboard (in which there is a column of keys for each digit), and the ten-key keyboard (in which digits are entered in left to right sequence). Registers, also known as counters, adding boxes, and accumulators, may be capable of addition only, or of both addition and subtraction. A crossfooter is a register which can add and subtract amounts from different co'umns.

Minor optional features include keys for printing the date, special characters etc. A special kind of accounting machine is the window posting machine. This is designed for a business which receives large numbers of cash receipts, for instance against electricity bills, rates assessments, or loan repayments. The ledger accounts are kept on cards in tub files at the cashier's window. When an amount is received the cashier pulls the appropriate ledger card, inserts it in the machine and keys in the opening balance and amount received. The machine prints the new balance, and simultaneously an official receipt which is handed to the customer, and an audit strip (cash receipts journal), which is locked inside the machine as a control on the cashier. This procedure avoids the waste and delays of passing copy receipts to a separate ledger posting section.

The advantages of book-keeping machines include accuracy (which saves time spent in searching for errors), time saved by automatic calculation of balances, up-to-date balances for management purposes, and greater legibility and uniformity of entries (which contribute to accuracy). Speed is often claimed as an advantage but it is doubtful whether the operation of keying in data is any faster than posting by hand. A reasonable standard is 60 line entries an hour (less for payroll work which is more complex). The speed advantage really lies in the greater accuracy and automatic balancing.

Another advantage commonly claimed is that several documents are prepared in a single operation, thus avoiding wasteful copying from one document to another. This is true, but the same advantage arises using simple posting boards (pegboards), which should always be considered as a possible alternative to book-keeping machines.

The main disadvantage of machines is of course their cost in foreign exchange. Also some flexibility is lost, since no machine is as flexible as a clerk (see section 8.25). Operators must be trained, though this is not difficult: the manufacturers will take ordinary typists and train them in a few days. Special stationery has to be designed, but if the firm has

not modernised its forms for some time, this is likely to be more of an advantage than a disadvantage. The stationery will usually cost a little more.

(vi) Calculators

A calculator is a machine that will multiply and divide. There are ten main types, viz.

Key-driven adding-calculators
Rotary calculators (lever set and key set)
Printing calculators
Electronic desk calculators
Slide rule
Ready reckoner
Abacus
Calculating book-keeping machines (billing machine)- see para (v)
Punched card calculators – see para xiii
Electronic computers – see section 8.24

Key-driven adding calculators (also called comptometers) perform all four arithmetic functions. Multiplication is made by repeated addition in each digit position, with digit shift across the keyboard. Division is similarly made by repeated subtraction. This demands touch operation, and the manufacturers recommend their use only with trained operators.

The expression "key-driven" describes the mode of operation. Depression of a digit key enters the digit directly into the register, and the total in the register is always visible in a row of dials. This is very much faster than setting up the amount on the keyboard, then pressing a motor bar, as in an adding machine, but demands greater accuracy since there is no visual check on the figures being entered. (Some machines register the multiplier, as well as the product). Answers have to be read off the dials; they are not printed. This type of machine is usually manually operated; (but may be electrically assisted) and has a full keyboard.

In the hands of a skilled operator, it can handle a large volume of work at low cost. In recent years, new models have been introduced which allow semi-automatic multiplication and division, e.g. the Contex. These are not so dependant on trained operators for their full exploitation.

Rotary calculators form the largest single class of calculators, and include all machines in which amounts are added into the register by turning a crank handle (or in electric models by depressing a motor bar or control key which does the same thing), and in which the carriage moves for each digit shift.

This group is divided into those in which amounts are entered by moving levers, and those in which keys are depressed. The lever-set barrel type models are usually small portable machines, even pocket size, operated by hand; operation is rather slow, especially for addition and subtraction, but they are relatively cheap and very dependable, and are still widely used for occasional calculation work, eg. by accountants.

Key set rotary calculators (not to be confused with key-driven adding calculators) have a keyboard instead of levers. The principal division of this group is between full keyboard machines, and the more recent ten-key machines. Both types may be manually operated (by turning a crank handle and pressing a lever to move the carriage into control keys). Electric models may be semi-automatic or fully automatic in either multiplication or division, or both. Semi-automatic means that the machine multiplies or divides for *one* digit; the operator must effect the shift to the next digit position. In a fully automatic machine, the operator sets up the numbers to be multiplied or divided, then touches the control key, and the machine carries out the complete operation. Fully automatic division is a fairly recent development.

Most machines will accumulate the sum of products, e.g. (a x b) + (c x d) by the simple expedient of not clearing the register between successive multiplications. This is useful for weighted averages.

Several machines have "constant factor multiplication". This enables the operator to calculate (a x k), (b x k), (c x k) etc. without the necessity of re-entering k for each multiplication. This is useful in distributions, e.g. spreading overhead over a number of cost centres.

A feature available on some machines is "back transfer." This means that the result of an operation can be fed into next calculation merely by pressing a control key, instead of reading the dials and setting up the amount on the keyboard. This is very useful for calculations of the type (a x b x c).

Keyset rotary calculators vary considerably in price. Hand models start at about Rs. 2,000/-, and electric models with special features go up to about Rs. 8,000/-.

It is usually advisable to arrange for regular maintenance, though some of the smaller hand models are very robust.

Printing calculators were developed from add – listing machines and rotary calculators. This machine performs all four processes of arithmetic, at the same time listing all factors and results on a tally roll. This provides a visual check of accuracy. Printing calculations are invariably electric, with the ten-key keyboard. They can be obtained with one or two registers and cost Rs. 4000–6000. They are somewhat slower that rotary calculators, and far slower than electronic desk calculators.

Electronic desk calculators perform calculations on electronic circuits and show results practically instantaneously on illuminated dials. They contain no moving parts (other than keyboard controls); thus they are silent in operation, and suffer very little wear and tear. Controls are very simple and the machine can be used with little or no practice. Operations are fully automatic, including the placing of the decimal point. Some models will provide answers to a required number of significant digits, correctly rounding the last digit upwards or downwards.

Electronic calculators are a recent development, but have already acquired a reputation for dependability. Though manufacturers provide maintenance contracts, little maintenance is required compared with electro-mechanical machines. The original Sumlock (Anita) and Friden machines have been followed by a flood of new (mainly Japanese) models. Prices are still relatively high, say Rs. 7,000–10,000, but are falling; also machines are becoming more compact and portable.

Their speed and versatility are exploited to the maximum advantage where a high volume of calculation has to be performed in a short time, especially where the calculations are mixed. Optional features include automatic squaring, square – rooting and raising to powers; these may be useful in statistical work and engineering calculations. Some models have additional registers for recall of data entered earlier, back transfer, etc. Some models now print out factors and results.

The common slide rule should not be forgotten where calculations are required only to three or four significant figures i.e. an accuracy within \pm 0.1% (Management decisions rarely if every require a higher level of accuracy). With a few minutes' practice the user can multiply and divide rapidly. Extended calculations of the form (a x b x c) or $\frac{(a \times b \times c)}{d \times e}$ can be carried out without re-entering intermediate products.

The decimal point is found from an approximate mental calculation. Addition and subtraction are not possible. The standard 10" slide rule (Unique Universal 1) can also be used for finding reciprocals, squares, square roots, cubes, cube roots, even fractional powers and roots, and trignometrical ratios such as sines and tangents. Cost is about Rs. 60/-. A special slide rule is available for facilitating commercial calculations in non-decimal measures such as weights, lengths, areas, volumes, and measures of time. Another special type is the engineer's slide rule.

Even cheaper is the *ready reckoner*. This is very suitable for multiplication and division jobs such as invoicing, estimating, and currency conversion, in which a limited number of factors are in regular use. Usually a ready reckoner should be hand-made for the job, so that it provides only those tables required, and in the most convenient form. This is even faster than the electronic calculator since no keying is required.

The abacus or counting frame, is another inexpensive device, widely used in the Far East and Middle East for all four processes of arithmetic. After suitable training, it is about as fast as a rotary calculator.

Choice and evaluation of calculator

The first step is to analyse the type and volume of calculation work required. Usually the great bulk of work is adding and subtracting; of the rest 85% may be multiplication and 15% division. If multiplication and division are standardised, it may be possible to devise a ready

reckoner, and to handle addition and subtraction on a simple addlisting machine. If multiplication and division are not required to more than 0.1% accuracy, slide rules may be used.

Apart from these simple aids, the cheapest machine is a hand-operated rotary calculator at about Rs. 2000. To justify this expenditure, it should be used about 1½ hours a day. (This assumes a clerical saving of about one hour a day at a salary of Rs. 300/– a month over a 10 year life with 66½ % lump sum depreciation allowance 50% corporation tax and 10% cost of capital). Dearer machines will require proportionately higher usage, e.g. a Rs. 4000/– printing calculator should not be used unless it is expected to be used 3 hours a day on average.

Sometimes it is possible to justify an expensive machine on the assumption that everyone will share in its use. This may or may not be realistic. A lot of calculation work is not "block" use e.g. monthly overhead apportionments, annual budgets etc. but occasional use by clerical personnel who are performing a variety tasks. The latter may not save much time if, every time the calculator has to be fetched from the previous user, especially if it is heavy. Use priorities must be established. Only one person can use a calculator at a time so the maximum saving is 8 hours a day, plus any overtime. In practice few calculators are utilised at over 75% capacity.

Optional features should be individually justified remembering that the additional expense should show corresponding additional cost savings. Automatic square roots, for instance, are rarely required in an accounts office. Features that are more likely to repay their cost are automatic multiplication (as against semi-automatic), constant factor multiplication back transfer, and memory or recall registers.

The ten-key or simplified keyboard is becoming more popular than the full keyboard as the hand does not have to travel so far and touch operation comes more quickly. Despite the necessity of having to enter zeros (automatically entered in a full keyboard), data is entered faster in the ten-key keyboard. Also the machines are cheaper and lighter. On the other hand, some ten-key machines do not provide a visual check on the amount set up.

Having chosen the type of machine and features, digit capacity etc. required, the selection from among the models available should be based on a test by the potential users, trying out typical calculations, and comparing speeds, noise factor, portability, reliability (so far as it can be judged), and maintenance call time, as well as cost.

(vii) Cash registers

A cash register is basically an add-listing machine with a cash drawer underneath. It provides an itemised receipt or sales ticket for each customer and/or certifies a sales bill that cash has been received, plus a record of every transaction on an audit strip locked inside the machine, total sales over a period, total number of sales over a period, and on

some models and analysis of sales over different categories, e.g. by department, or by salesman.

When the sale is rung up, the amount is clearly indicated to the customer. This and the receipt provide a double check that all sales are accounted for.

Though the audit strip (sales journal) can only be extracted from the machine with a master key, some models have an antographic feature; this enables the cashier to add details of transactions by hand onto the audit strip through a window, while protecting the printed entry. Most cash registers have the full keyboard, but some have the 10 key keyboard.

(viii) Charts and planboards

Charts and planboards are designed for visual presentations of control data. Typical presentations are comparisons of actual data with plan or budget for sales, production, orders, stocks, job or contract progress, machine loading, personnel statistics, etc.

Commercial planboards usually take the form of perforated wood or metal panels onto which coloured signals, pegs, cards, etc. can be affixed in various positions, or panels containing horizontal channels in which coloured strips may be slid. These are standard bases intended for a wide variety of uses. The ordinary flipboard may also be mentioned as a suitable base for visual presentations, on which sheets of drawing paper may be marked by falt-tip pens.

It is often cheaper for the firm to produce its own planboards both general purpose and for specific jobs. Unilever Ltd. for instance had some black holland material pleated and stitched to make pockets into which small cards could be placed with the top edge visible. This "board" could be hung on the wall and if required, rolled up for storage. Another general purpose base is plastic sheet which has electrostatic properties; thin coloured plastic signals can be cut to shape, pressed into position, and peeled off as required. All the familiar types of chart can be represented on the above bases, including bar charts, Z charts, Gantt charts, network diagrams, and graphs.

Where security is important charts may be screened by lockable doors or panels.

In designing a planboard, the more frequently it is to be up-dated, the easier the operation must be. Where planboards are tedious to maintain (or difficult to understand) they soon fall into disuse.

Boards may be stood on desks, mounted on walls, or fixed on sliding panels (as in the National Operations Room). For decentralised control, they may be photographed and copies distributed to control points. (For *computers*, see section 8.24)

(ix) Duplicating machines

There are various ways of producing a number of copies of a document. The commonest method is carbon paper. An ordinary typewriter

can produce upto about five good carbon copies; more than that would be very faint. If very thin copy paper is used a typewriter with a hard platen and sharply cut letter type may get 10–12 copies. An electric typewriter may go up to 20 copies. However, there are two disadvantages to multiple carbon copies; one is that copies are very flimsy, and the other is the time the typist spends in correcting mistakes, erasing and re-typing each copy separately. If more than, say, five copies are required, it is cheaper to type once on a master, then duplicate the master on a duplicator.

A photocopier will make copies of almost any original but usually at higher cost than a duplicator since photocopies are made on sensitised paper. If more than a few copies are to be made, it is usually cheaper (though not so convenient) to type a master and run off copies on a duplicator, since the latter uses ordinary paper. Recent developments in xerography and electrostatic copying however, are tending to break down the distinction between photocopying and duplicating. There are three main duplicating processes:

- (a) spirit
- (b) stencil
- (c) offset (lithographic) also called office printing

All three produce multiple copies of an original document from a master which has to be specially prepared.

In spirit duplicating (or hectography), the text is typed or written onto a sheet of art paper, backed by a sheet of dye carbon so that the image appears in reverse on the back of the art paper master. This is then clipped onto the drum of the duplicator image side out, and dampened with spirit (ethyl alchohol or methylated spirits). Copies are made by contact, a small amount of the dye-carbon being transferred onto each copy.

The number of copies is limited to about 100, though this may be increased by using high grade hectograph carbon, and keeping the flow of spirit and roller pressure to a minimum. The colour most often used is purple, since this gives most copies. The master may be stored and re-used.

An advantage of the spirit process is that copies can be obtained in more than one colour in a single run-off by preparing the master from appropriate sheets of carbon.

A disadvantage is that copies tend to fade in sunlight.

The machine cost is low and also the copy cost, since almost any kind of paper can be used for run-off. Compared with other duplicating processes, very little operator training is required. Like the other processes, it tends to be somewhat dirty in operation.

Where a large number of spirit masters have to be typed, considerable time and carbon paper may be saved by using a typewriter with a hectographic carbon roll attachment. An electric typewriter should be preferred since it provides an even density of type.

Spirit masters can be prepared directly from originals without intermediate typing, on a photocopier which works on the electrostatic, heat transfer or diffusion transfer process (not described here).

Machines may be hand-operated or electric. Electric machines may have special features for systems work such as simultaneous printing from a constant master and a variable master ("double clip"), selection of part of a master for copying (e.g. to suppress price details on a copy of the invoice to be used for posting stock records) etc. An example would be a sales order/billing procedure. When the order is received a master is typed with customer name and address, delivery address, order number, date, quantities and prices. Copies are run off for despatch instructions, sales office records, customer acknowledgement and stock records. When the goods are despatched, the master is taken from the file, quantities despatched are entered and rupee amounts extended and added. New copies are run off to act as invoice, sales ledger posting copy, stock records, sales analysis, etc. Copies are in different colours for clear identification. If masters are imprinted with the firm's letterhead, all copies can be made on plain paper.

Stencil duplicating (mimeograph) still the most widely used process in Ceylon, is based on forcing ink through a "wax" stencil. The stencil may be cut on a typewriter by any good typist, or by hand (using a metal stylus or wheel pen), or automatically from any original by an electronic stencil cutter.

The number of good copies goes into thousands. The stencil may be stored and re-used. Any colour ink may be used, black being favourite as it stands out best. Copies cannot be produced in more than one colour except by more than one run on the machine, which must be thoroughly cleaned between runs in different colours.

Operators are easily trained.

The machine is more expensive than a spirit duplicator, and the copy cost is higher since special semi-absorbent paper has to be used for run-off copies; also stencil masters are more expensive than spirit masters. On the other hand, the stencil process is not limited to runs of 100 or so, and provides more permanent copies of better quality. For quantities of 100 to 1,000 copies the stencil process may be preferred where the volume of use does not justify the purchase of offset lithe equipment.

Production standards for duplicating depend partly on the theoretical rate of the machine (which may vary from approximately 1 per second to 3 per second) but mainly on the length of the average run. Where runs are short, an average time for set-up, run and take-down is 6 minutes.

The stencil process is not much used for systems work, though it is possible to delete information by correcting fluid or overlays, and add in new data (after cleaning the stencil).

Offset lithographic printing is based on the fact that oil and water do not mix. The master is typed using a special typewriter ribbon which gives a greasy image. In the machine the master is damped with water, then with greasy ink. The ink adheres to the image but not to the rest of the surface. Copies are then made by pressing ordinary paper against the inked master.

This in itself would give a mirror image. The offset principle corrects this. Between the cylinder carrying the master and the impression cylinder carrying the copy paper, is interposed a third cylinder carrying a rubber "blanket" which receives the laterally-reversed image and reverses it again onto the copy paper.

Masters (more often called "plates" or "mats") used to be thin sheets of zinc or aluminium. Metal plates are now only used for very long runs, such as 5,000 – 50,000 copies. Plasticised paper plates have been developed which are cheaper and according to grade will make up to 5,000 copies.

Masters may be prepared on a typewriter by any good typist, or hand-drawn using a special reproducing pencil, or from a photographic negative. They can be stored after treating with preserving solution and re-used.

Lithography is one of the oldest printing processes, like letterpress, which prints from raised type, and gravure, which prints from an etched or sunken image. In recent years, as offset litho, it has become a very popular method of document reproduction in the office. Its advantages are very high quality, even in long runs, and low copy cost, since ordinary paper is used for run-off and paper masters are cheap (say $\frac{2}{3}$ the cost of a spirit master or $\frac{1}{3}$ of a stencil master).

The major disadvantages are the high capital cost of the machine and the necessity for trained operators, though some machines are fairly automatic in operation.

Choice of process

If the production of originals can be controlled, the cheapest and quickest way of making more than about 5 copies is by producing originals directly onto masters and duplicating the masters. If originals are not on masters it is probably more economic to use an office photocopier to produce a master than to retype the original onto a master. The cheapest photocopier is a diffusion transfer machine, which will make a spirit master (good for up to 100 copies).

If a firm has diazo (dyeline) equipment traditionally used for making engineering blueprints), this is the cheapest photographic, but requires a translucent original. If the original is opaque, a translucent master can be made on almost any photocopier.

The size of the originals to be copied should be considered. Most copiers and duplicators go only up to foolscap. Brief size machines are not always available.

The number of copies required from each original is a most important factor. The spirit process is cheapest for short runs.

Another important factor is the volume of work. Where the volume is high and the capital cost can be divided over a large output, offset litho is the cheapest process for any length of run, down to the point where it is cheaper to take carbon copies (say about 5).

Other factors to be taken into account are storage of masters, alteration of masters, availability of supplies and service, operator training, need for variations between copies for different purposes (blocking, line selection, etc.) need to reproduce a master from a master, ease of preprinting masters, e.g. with firms letterhead, use of equipment for other work such as sales literature, annual report, office bulletins, etc., need for multicolour copies, permanancy of copies and copy quality.

(x) Filing and records equipment

Filing is the art of classifying and arranging documents (correspondence, invoices, orders, reports, plans etc.) so that they can be easily located (retrieved) when needed.

The design of a filing system depends upon the requirements. The answers to eight basic questions determine the classification of documents, where the files should be located, the procedure, equipment and staffing. The questions are:

- 1. how many documents are to be held in the files?
- 2. how many documents are to be filed each week?
- 3. how many references are to be made to the filed documents each week?
- 4. how long must the documents be retained -
 - (a) to be worked on?
 - (b) for frequent reference?
 - (c) for infrequent reference?
- 5. what protection is necessary against fire, dust, dampness, white ants, theft or unauthorised reference?
- 6. what delay in producing a document is tolerable?
- 7. who normally uses the records?
- 8. how are the documents normally described and asked for? e.g. by name of customer, by part number, by subject of correspondence.

The answers to questions 4 – 8 determine the classification. There are five basic methods of classification: alphabetic, chronological, geographic, numeric, or by subject. These methods are often combined, e.g. sales invoices may be filed by customer (alphabetically), and then for each customer, in date order (chronologically). Alternatively, customers might be classified first by their towns (geographical classification in alphabetical order), then for each town by customer (alphabetic). In a follow-up or "tickler" file, documents are filed first according to the

future date on which action is to be taken. With a subject classification, subjects are usually arranged in some logical sequence and then codenumbered; an index is necessary to get the number of a subject. A familiar example is the Dewey decimal system used in libraries.

The filing procedure should be defined from the point of authorising the filing of a document to its final destruction. Most firms file far too much, and "weed" far too little. This costs extra space, extra filing equipment, and extra time finding documents that *are* required. Acknowledgements, compliments slips, drafts, extra copies, correspondence, setting up meetings which have been noted on desk diaries, circulars which are available centrally etc., etc. should go to file No. 13 – the waste paper basket. Inactive records which must still be preserved should be transferred to cheap files (known as transfer files) stored in archives where space is cheap, or microfilmed and destroyed.

Equipment should be selected to meet the actual needs of the system, having regard to the size of documents, whether size is uniform, the space available, the degree of classification, volume of records, the volume added each day, how often files will be handled, whether they will be referred to on the spot or taken away, need for indexing and cross-referencing, the need for signals, protection and security required, and future expansion. Very often the simplest filing equipment is best, but tends to be overlooked because it is thought old-fashioned or because of the salesmanship of filing equipment manufacturers. An example is shelf-filing, the normal method of filing before four-drawer filing cabinets came on the scene in the 1920's. Shelf filing is now recognised as being not only cheaper than cabinets in capital cost and floor space, but also more efficient in use.

Filing equipment may be divided according to whether documents are held in a horizontal position, or vertically. *Horizontal* filing, such as a spike for bills, or papers stored flat in a drawer, is not popular as it is necessary to remove all documents above the one required. Horizontal filing is mainly used for very large documents such as maps and plans.

In vertical filing documents stand on their edges. This may be in a drawer of a cabinet or a deep desk drawer. They are usually divided between manila folders according to the system of classification, and folders have projecting tabs giving the reference titles for rapid location. Stout guide cards may also be used for index tabbing. A standard 26" drawer holds about 4,000 sheets in 300 folders, with 20–25 guide cards.

If the folders sit on the bottom of the drawer it is necessary to fit a "follower" block at the back to prevent their falling. In modern filing cabinets this has been superseded by suspending folders from rails at the sides of the drawer. However, this costs more and reduces space by up to $\frac{1}{3}$. Sometimes folders are provided with hooks so they drop directly onto the rails: alternatively plain folders can be dropped into pockets hooked permanently in position.

Vertical filing is used widely for correspondence, business documents, and cards (record cards and punched cards, using drawers and cabinets of appropriate size). Its main disadvantage is that space has to be provided not only for the cabinet container, but also for pulling out This has led back to lateral filing, which is merely vertical filing approached from the side. Any wall space can be fitted with rails running parallel to the wall from which files or file pockets are suspended. The index tabs in this case project from the side of the files since this is how the user faces them. This has the advantage that files can be identified above eye-level: 7 or 8 tiers of files can be accessed without steps, compared with only 4 tiers in drawers. Access is more direct, since all tabs are visible without pulling drawers. For security against fire and theft the rails can be mounted in a lockable metal cupboard: if the only protection required is against dust, a roller blind is sufficient. Lateral filing is not limited to wall space; free standing units can be arranged back to back. It is a very flexible system as it can be exactly tailored to the space available.

Shelf filing has all the above advantages of lateral filing, but without the suspension gadgetry. Large numbers of hook-on files or pockets are expensive. It is cheaper to place plain files or folders on the shelf in a vertical position and keep them from falling by blocks, bookends or metal plates slotted into the shelf. The cost of shelf filing is about one quarter of drawer filing.

Files should be marked or tabbed at the side as before. Doors may be fitted for security. Apart from manila folders, documents may be contained in lever-arch files, or concertina files, which are large enough to stand without support.

Revolving filing: Where files are wedge-shaped further space may be saved by storing them on circular platforms. Each file stands vertically with the title on the spine.

Financial accounts, stock records and other running records are also record documents. The same principles as above apply in designing a filing system. A further consideration is that running records require not only easy location for reference but also easy entry of transactions.

Accounts may be kept in bound books, loose leaf binders or on cards.

Bound books have been obsoleted by the development of loose leaf and card records, since it is not possible to keep accounts in a bound book in logical order. After a time, accounts have to be continued on spare folios elsewhere in the book, and a special index becomes necessary. Also dead accounts can be removed from loose leaf and card records, thus facilitating the search for active accounts. Finding the right folio takes the major part of the time spent in posting accounts, so must be efficiently organised. Bound books have no special disadvantages for records entered in *chronological* sequence such as journals and daybooks, but loose leaf and card records are better for ledgers, asset registers, share registers, stock records, etc. Loose leaf *binders* are simply hard

covers of any desired size between which sheets of paper, pre-printed with the account ruling, can be fastened as required. The method of fastening may be a metal *ring* which can be snapped open or shut, or two metal *posts* onto which leaves are threaded, or two flexible canvas thongs which pass through slots in the leaves and by means of a key can be loosened to remove sheets or tightened to hold them. The post type is cheapest but is not quite so convenient for insertion or removal of leaves. There are also binders in which loose leaf sheets can be filed in banks or gangs overlapping like slates on a roof so that the lower edges are visible (see visible filing below).

Cards can be cut any size and printed with any desired ruling. Standard small sizes are 5' x 3" (used mainly as index cards for reference only), 6' x 4" (used for credit control, stock records, etc.), 8" x 5" (e.g. personal records) and $7\frac{3}{8}$ x $3\frac{1}{4}$ (punched cards). Ledger cards posted by accounting machine are usually larger. The weight and rag content of the card should depend on the frequency and type of handling it will receive. The care taken by clerical staff in handling records depends mainly on their accessibility; records kept within sitting reach are treated more kindly than records which have to be walked to, reached for, or posted standing up.

Cards may be filed vertically, i.e. on their edges, without further support. In this position they are often called blind cards. They are usually housed in file trays or drawers of the right depth, with tabbed guides inserted every 25 to 50 cards for easy location. Key data is written at the top of the card where it can be seen without extracting the card. A flat surface must be provided for resting the card when entries are made. Ledger cards for machine posting are often kept in tub files, i.e. trays mounted on trolleys which can be wheeled to the operator's desk, and back to the vault.

Visible filing is any file in which the key information and signals on each record can be seen without handling. This is usually arranged by overlapping records so that the lower edge of each record can be seen. Key information is the reference by which the record is filed and located. Signals are coloured plastic or paper strips or tabs which can be attached to the visible edge. These denote special characteristics, e.g. in a stock records system, a red signal may be attached to cards for items requiring re-ordering; after re-ordering each item the signal is removed. In a sales customer file kept in alphabetic order, signals may be used to denote sales areas.

No guides are necessary as the records are their own guides.

Visible loose leaf binders were mentioned above. Visible card records may be contained in horizontal trays in cabinets (the most familiar equipment), or on vertical racks standing on a desk, mounted on a wall, or rotating around a spindle, or on cardwheels rotating either vertically or horizontally.

Comparison of loose leaf and card systems

Paper is cheaper than card, and a good quality rag paper has a life which will meet most office needs.

Equipment costs vary widely. Cheapest is the post-type binder; dearest is visible edge equipment.

The visible edge systems claim speed of access, but often the bulkiness of the equipment means that cards cannot be reached by the clerk in a sitting position. 10,000 cards of 8" x 5" would require 6 standard size cabinets occupying 126" x 50" (allowing for pulling out trays). The same number of blind cards in drawers would occupy 102" x 27". Paper needs far less space. 10,000 sheets in 20 binders can be housed on the back 10" of an ordinary desk.

After access to the right tray of visible edge cards (commonly 63 cards to a tray), the wanted card is quickly found by running the eye down the card edges. Entries can be made without removing the card. This is faster than blind cards but, according to user tests, slower (and more tiring) than loose leaf sheets in a well-indexed binder, since in the latter the eye is fixed on a certain position while the pages are turned in a rapid finger scratching movement (see "How to Cut Office Costs" by Harold H. Longman, publ. Anbar).

For adding or subtracting records, or rearranging the order of records, blind cards are easiest, with post or ring type binders not far behind. Visible edge records (in cabinets or books) are slower.

The advantages of visible edge systems are that they look neat, and secondly, the signalling facility. A blind card can be signalled only by turning it on end, or by sticking in a coloured marker. A loose leaf sheet can also have a projecting marker (like a book mark), but this may fall out. The system designer should carefully consider whether signalling is necessary (and is not a mere management toy) and will in fact be operated, since many signalling systems are not properly kept up-to-date, management lose confidence in them, and they fall into disuse.

Visible card and strip *indexes* (for reference rather than entry) are often used for quick reference where the hands are occupied, e.g. by telephone operators referring to telephone numbers.

Mechanisation of Filing

Where a large volume of records are kept, the location of files can be very laborious. A wide variety of equipment exists for bringing the right file to hand, from the simple rotary file and sliding file units to automatic conveyor systems which deliver files at the touch of a button.

Filing, in fact, is one phase in data processing. Considerable research has gone into the organisation of file records so that data can be stored cheaply and compactly, and retrieved quickly. Alphabetic and numeric data can be recorded on punched cards, magnetic tape, data cells and various other storage devices. Graphic data, such as

engineering drawings, can also be recorded magnetically but this is still expensive. An alternative is to microfilm drawings, reducing them to about one fortieth of their size, and insert the patch of film in an aperture card. This is a punched card with a window cut in it. The card is then punched with the drawing's reference number and any other details and filed. Any card can be found, and the drawing reproduced, in seconds.

(xi) Pegboards

The pegboard (also called posting board or manifold board) is a board with a holding device for forms and carbons so that forms can be accurately aligned and entries made manually in the appropriate positions on all forms simultaneously.

Carbon copies can of course be made without any holding device if the copies are the same size as the original and entries are to be made in the same relative position; the pegboard is used where entries have to be made in different positions on different forms for different purposes.

A typical application is sales ledger posting. Traditional practice is:

- (1) enter details in a Sales Day Book from the copy invoice
- (2) post from the Sales Day Book to Sales Ledger Accounts
- (3) copy details of Sales Ledger accounts onto monthly statements.

On a pegboard, the statement, ledger account (loose leaf), and Sales Day Book (loose leaf) are aligned with intermediate carbons and all three entries are made in one writing. Invoices are pre-sorted by customer, and the first customer's account, interleaving carbon, and statement are extracted from the ledger file (where they are kept together), put on the board, invoices entered, then returned to the ledger file. This is repeated for each customer in turn. The Sales Day Book sheet remains on the board behind successive ledger accounts and moves up one line for each invoice entry. As each sheet is filled, it is filed in a binder and a fresh sheet put on the board.

The advantages of the pegboard are -

- (1) The three-in-one principle saves two-thirds of clerical time
- (2) Copying errors are eliminated; nor is there any need to check postings.

The similarity of the pegboard procedure to accounting machine procedure will be apparent. Both create three (or more) copies in a single operation by means of carbon paper. Like the accounting machine, the pegboard is also used for posting cash receipts to the sales ledger, purchase invoices and payments to the purchases ledger, payroll, stock records and cost accounting. Stationery must be specially designed and be pre-punched to fit onto the pegs.

Differences from machine posting are as follows:

(1) the new balance is not automatically calculated and printed. Pegboard manufacturers have various methods of proving balances calculated and entered by hand;

- (2) there is no automatic analysis facility;
- (3) entries by hand are not so legible, uniform or neat as machine entries;
- (4) no special training is required; any clerk with legible hand-writing can use a pegboard;
- (5) a pegboard costs, say Rs. 20 200 whereas an accounting machine costs Rs. 12,000 Rs. 75,000 (foreign exchange);
- (6) posting by hand should be faster than machine posting (a reasonable standard for machine posting is only 60 postings an hour), but accuracy is lower, so an overall time comparison depends mainly on the degree of clerical accuracy. For a detailed comparison, see "Efficient Accounting Methods" by H. F. Wilson (Gee) Chapter XIX.

In one pegboard system, sales and purchase day books are entered up without being removed from their binder.

Daybooks can have analysis columns, and entries can be made in these columns during the posting run, or as a separate operation.

As with machine posting a control account should be kept. The total of each batch of posting media is posted to the control account, and the balance on the control account is agreed with the total of ledger balances.

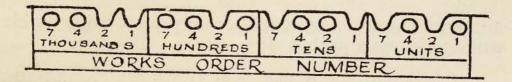
(xii) Punched Cards (manual)

These are also called needle-sort cards. They may be edge-punched or centre-punched. An edge-punched card has holes running round the sides. Any hole can be slotted open to the edge of the card by means of a punching device (not the same as a punch for mechanised punched cards). When a needle (like a knitting needle) is inserted through a particular hole in a pack of cards, and lifted, the slotted cards fall.

A centre punched card has pairs of holes throughout the body of the card. A slot can be punched between any pair of holes, so that when needled, slotted holes drop to the depth of the slot and can be manually separated. Needling takes place in a special cradle.

Cards are punched (i.e. slotted) according to a pre-determined code. As far as possible a hole is provided for each condition e.g. if it is desired to record which out of 7 salesmen made a sale, 7 holes are provided and the one representing the salesman is slotted. A more condensed code would use only 3 holes, representing 1,2 and 4, e.g. if salesman number 6 made the sale, the 2 and 4 positions would be slotted. Sorting on this code takes longer.

One decimal digit usually requires four holes, representing respectively 7, 4, 2 and 1. A works order number of 3289 would be edge-punched as follows:



In fact 4 holes can represent any number up to 14 or half the alphabet. A fifth hole is notched if the letter is in the N-Z range, and left un-notched for A-M.

The information carrying capacity of a card depends on the size of the card, whether holes are edge-punched or centre-punched (for a given size of card the latter holds more holes), and the coding system used. Cards are often dual purpose, i.e. space is provided for writing or typing information; only the main sorting variables are punched. This widens the scope of cards; for instance in personnel records it is not necessary to provide a hole for every possible language that an employee might speak; a hole would be provided for each of the three main languages, and one for "other languages", which would be detailed on the card.

There is no rapid way of summarising data from a number of cards (as with mechanised punched cards). After sorting, cards must be read (or interpreted), listed and totalled by hand.

Needle sort cards are not at present marketed in Ceylon.

Applications

Needle sort cards can be used for analysis or selection.

A common analysis application is sales analysis. A card is punched for each commodity on each invoice. Useful sorting variables are commodity, sales area, salesman, type of customer, etc. Analysis entails sorting according to the desired variable, then add-listing each category in turn. This method of analysis suffers from the disadvantage that a separate record has to be prepared for no other reason than to sort it. It is not at present possible to produce needle-sort cards as a by-product of invoicing (see Section 6.18 on sales analysis).

An asset register may be kept on dual purpose edge-punched cards, punching in the asset classification code, asset number, depreciation code, date of acquisition, location, etc. Other details such as costs, depreciation written off, etc. are written or typed in the centre of the card. Assets may be rapidly analysed under any of the punched variables, e.g. by location in order to provide an inventory for the location manager.

Selection is the same as sorting, but the desired characteristic is rare, so there is no need for separate summarisation. For instance,

personnel record cards, one for each person, may be needled to find any French-speaking managers, provided these two characteristics have been punched.

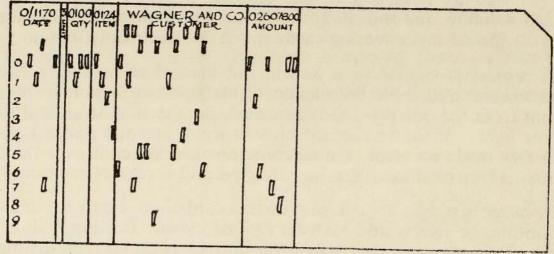
(xiii) Punched Card Systems (mechanised)

The American census of 1880 took an army of clerks seven years. From the millions of individual returns they analysed and summarised the number of people in each age group, occupation, place of domicile, etc.

For the census of 1890, all the information in the return was expressed in punched cards, the position of punched holes indicating age, sex, occupation, etc. Machines were constructed which, by sensing the holes, could quickly sort the cards into any required order, and count the card in each category.

This remains the outstanding benefit of punched cards – that they can assemble the same basic information in a variety of permutations and combinations with great speed and accuracy.

The 80 column punched card of today is basically the same as the dollar-note-sized card of 1890. One card contains all the details of one transaction; for this reason it is often called a *unit record*. For instance, a sale of 100 cases of BOP tea to Wagner & Co. for Rs. 26,078 on 1st November, 1970, might be punched as follows:



Note that the card is divided into fields, one field for each detail such as date, quantity, etc. A number is recorded by a single hole in the respective column; a letter is recorded by two holes in the same column according to a certain code. Punctuation and arithmetic symbols can also be represented. A number, letter or symbol is referred to as a character; evidently one card can contain up to 80 characters of data.

A considerably greater amount of information can be condensed into a limited number of columns by coding. For instance, "cases" are represented by the code no. 3 in column 6 and "BOP tea" is represented by item code 124.

Cards may be used for writing the original information which is then punched into the card by a punch operator. This is called a *dual* purpose card. An example is a stores issue card on which the date, quantity, stores code and department code are written in the ordinary way. Cards are then batched and punched.

Punched cards, which have been used since the beginning of the 20th century, are now also used to feed data into computers which have only come into use since World War II. A punched card installation can do many of the simpler and more routine jobs that its more sophisticated offspring can do, but not so quickly, nor so automatically; in a punched card installation each machine has to be separately controlled and data is moved from one machine to another by hand. On the other hand, punched card equipment is cheaper and more economic for smaller routine jobs.

The basic machines in every punched card installation are punch, verifier, sorter and tabulator.

A card punch is a machine in which cards are perforated as a coded record of information. The machine is usually electric, and has a keyboard which may be numeric or alphanumeric. Blank cards are placed in a hopper and pass one by one, a column at a time, under punch dies. Most machines have a program unit, which allows the machines to skip columns which are not being punched.

Other types of punch have special facilities, e.g. printing data on the card (as well as punching it in); reading punched data, multiplying specified columns and punching the result; and punching from graphite marks on special mark sensing cards which are electrically sensed.

A verifier is similar to a punch, but instead of making a hole, it checks whether a hole has been made. If the operator keys in a character different from the one previously punched, the machine stops and shows an error light. If the verifier operator is right, and the punch operator has in fact made an error, the machine notches the card over the error column. (This card can then be extracted and a correct card inserted).

A sorter arranges a stack of punched cards into a desired sequence for printing, or selects and extracts desired cards. Sorting is done one column at a time, and the cards drop into 13 pockets, representing the 12 punch positions in a column, plus a reject pocket. Thus to sort cards by account number where this occupies 3 digits, 3 sorts are necessary starting with the right-hand digit.

Some machines sort at 2,000 cards/minute.

The selection of cards is on the same principle. Selection may be made of cards punched with specified digits or with a specified date or of cards higher or lower than a specified number, etc.

A tabulator prints out information from sorted cards in the required format. It may also add and calculate before printing out, and information printed out may be accumulated in registers to provide sub-totals and totals. (With these facilities it is often called an accounting machine, but should not be confused with the keyboard accounting machine).

Information may be printed in complete detail (detail printing) or summarised (group printing). Speeds are 80 to 150 cards/minute. Print out is on continuous stationery. The "nerve centre" of the tabulator is the control panel. This is a board in which electrical connectors are plugged so as to set up the circuitry required for a particular job. The control panel selects the data to be extracted from the cards and sends them to the adding mechanism or to storage or directly to the print unit as required, calculates and stores results, and prints interim and final totals, identification detail, page numbers, etc. in the correct positions.

The manufacturer prepares the control panel. Changing from, say, payroll to sales ledger posting is a simple matter of interchanging the respective panels.

Auxiliary machines which may be used are as follows:

A gang summary punch has two functions. As a gang punch it can reproduce the holes in a master card into blank cards at high speed. This would be used, for instance, to create details of standard sales to which customer names and other data can be added as the sales occur, thus saving time. The second function is to punch summary or balance cards automatically during a tubulator run. A summary card contains a total which is to be used in further processing, such as the total of an invoice. A balance card contains, for instance, the balance on a customer's account, or an employee's cumulative pay to date.

The electronic calculator combines a sensing unit, an electronic program control, calculating unit, store unit, and a punching station for output. All four arithmetic processes can be carried out at speeds of 30,000 calculations or more per hour. The calculator will follow a short pre-determined program of instructions.

A collator merges two groups of pre-sorted cards into one file, or matches cards in two groups separating out unmatched cards. Merging could be done on the sorter, but if the groups are already sorted, this would be inefficient. This operation also takes place on one column at a time. Collating speeds go up to 1,300 cards/minute. A typical use of merging is to combine into one file cards carrying fixed data, for instance, customer names and addresses, with cards carrying data on transactions for a period.

An interpreter translates punched holes into information and prints it on the card. This allows files of cards to be read as easily as typewritten records. Information can be printed in any desired sequence and usually on one of the top two lines. Speed is 60 cards/minute.

Common data may be printed repetitively from punched information on a master card.

A typical use of punched card equipment is sales invoicing. Cards are pre-printed for fixed data on customer names and addresses and

standard quantities, prices and amounts for each commodity. In outline the sequence is as follows:

- (1) from shipping orders assemble detail cards for each line of the invoice;
- (2) use calculating punch to extend amounts due on non-standard quantities or items;
- (3) create cards for date, invoice/order number, freight, department and salesman responsible for sale, and any special shipping instructions;
- (4) assemble customer name and address cards. N.B. A multi-line printer accounting machine can print a 3 line name and address from a single card;
- (5) merge all heading and detail cards;
- (6) print invoices on continuous stationery in accounting machine. A reproducing punch is connected to the accounting machine so that invoice totals can be punched into blank cards as invoices are printed;
- (7) fold customer copies of invoice, insert in window envelopes and mail;
- (8) distribute other copies of invoice;
- (9) re-sort cards.

The main advantages of punched card systems are as follows:

- (1) cards may be sorted and collated in any order quickly and cheaply, and information presented in many different ways;
- (2) repetitive calculations are made fast and accurately;
- (3) all data input is verified and its accuracy ensured;
- (4) the coding of punched data is an advantage where data is confidential e.g. on a payroll application;
- (5) the punched card is a permanent record, and the information on it may be reproduced at any time.

Disadvantages are -

- (1) the case of sorting may encourage unnecessary analyses;
- (2) punching and verifying is an expensive way of recording data;
- (3) cards are not easily read except by using a special machine (a printing card-punch or an interpreter);
- (4) the coding of information for punching is a frequent source of error;
- (5) cards are a bulky form of storage and need protection from damp, natural static and fire.

(xiv) Summariser Boards

A summariser board is a board on which standardised forms can be held overlapping across the board so that relevant data on each form are visible and can be summarised by cross adding. Usually the board has

a row of pegs across the top and forms are pre-punched to fit onto the pegs. A straight edge can be slid up and down to any line to in cross-adding.

Summariser boards are sometimes called pegboards or strip accounting boards. They can be used whenever a number of documents have to be regularly summarised, e.g. daily production reports to a weekly production report, branch sales to total sales, monthly costs to get costs-to-date, etc. A board costs Rs. 100 – 1,000/–.

8.24 COMPUTERS

Electronic digital computers used for commercial data processing consist of a configuration or assembly of machines ("hardware") linked by cables, and run by carefully prepared programmes of instructions ("software"). We must first consider the main types of machine (out of hundreds marketed) and what they do.

(i) Computer hardware

The central processing unit (CPU) is the heart of any computer. It has three functions – to store the programme of instructions and data currently being processed, to perform arithmetic and logic operations on such data, and to control the operation of the whole computer, including ancillary input and output machines. The store is sometimes called internal store, to distinguish it from external storage devices such as magnetic tape units. The most common system stores data in binary form in tiny ferrite cores or rings, hence the term *core storage*. It is not necessary for the computer user today to understand binary representation or the electronic circuitry of the processor just as a car-driver does not need to know the principles of the internal combustion engine.

For the management accountant of course the important factors are what it does and what it costs. However it may be mentioned in passing that the physical elements of the processor were at first radio valves; the second generation technology, still in wide use, is based on transistors which are far faster and more reliable than valves; the third generation computers use integrated circuits which in turn are cheaper and more compact than transistors. Further generations are to be expected, since computer technology is only 20 years old.

The main operational features of a processor are its core storage capacity, and speed. Core storage is commonly expressed as 8 K, etc. In an IBM machine, 16 K means 16,000 "bytes" each of 8 "bits" of information (A bit, or binary digit, is the smallest unit of data. Almost all commercial computers process data in binary form). In an ICL machine 16 K means 16,000 words each of 24 bits.

The speed at which arithmetical and logical operations are carried out is of course the feature that has attracted popular attention. A basic operation (which may have to be regularly performed millions of times) may take only one micro second (a millionth of a second) since electricity moves at the speed of light through extremely tiny circuits.

The essential feature of a computer which distinguishes it from accounting machines, electronic desk calculators, etc. is that it can amend its own programme according to the results of previous operations. The very speed of its operations demands a continuous flow of instructions catering for every eventuality without intervention from outside the system.

Programme and data have to be fed into the processor. This is usually in the form of punched cards (see section 8.23 (xiii)) or punched paper tape. 80 column punched cards can be "read" into the processor by a card reader at up to 1200 cards per minute; a typical paper tape reader can read in 1000 characters per second. Though these speeds sound fast, in fact they are extremely slow compared with the processor. The bottleneck in a commercial computer application is usually the input or output unit rather than the processor.

Magnetic tape is an alternative form of input to a processor which is far faster; a typical rate for transfer to (or from) the processor is 100,000 characters per second. However putting data onto tapes usually entails reading cards into the processor which transfers the data in a suitable mode onto tape. Recently magnetic tape encoders have come onto the market. This is a keyboard machine by which data is entered directly onto tape. This avoids card punching and processor time, but the encoders are still relatively expensive.

Magnetic tape is a very convenient form of data storage. One 2400 foot tape can contain over 20 million characters in a very compact form. Its main disadvantage is that it can only be read serially; to read a character of information at the far end of the tape, the tape unit takes about 3 minutes reeling the tape through to the desired character. data to update a tape file (e.g. invoices for the month to be entered in a sales ledger kept on tape) must first be sorted in the same order as the tape file otherwise the processor will spend all its time waiting for the tape unit while it hunts backwards and forwards along the tape. Hence random access (or direct access) storage devices such as disc packs. consist of 14" magnetic discs mounted one above the other, rotating about a shaft. Over each disc is a read/write head which, given suitable electronic instructions, can pick up data from a specified "address" on the disc and read it onto the processor or alternatively take data from the processor and "write" it in to the disc. A typical disc pack can access any one of 10 million characters within one tenth of a second. This is very useful for jobs require frequent reference and updating in random order, and has made possible real time systems. computer systems in which new data are processed as they arise. For instance it would be no use to an airline to handle ticket applications by batch processing; it is necessary to know the state of bookings on a second-by-second basis so that applications can be accepted or rejected on the spot. In the U.S., Japan and U.K., real time systems are used for branch banking so that a customer can have immediate information about his account from a central computer, linked to branches by data transmission facilities. However random access as a means of storage

is much more expensive than serial access magnetic tape and would only be used where the benefits justified it. Another form of magnetic storage is magnetic stripes on the back of conventional ledger cards. These stripes contain the account number and balance outstanding. This is called "off-line" storage, to distinguish it from tapes and discs which, when directly connected to the processor, are on-line.

Tapes discs and stripes all record data by means of magnetised spots; like types on conventional tape recorders they can be erased and re-used many times (unlike punched cards and paper tape which must be scrapped after use).

Printed output ("hard copy") is provided by a line printer. This is an electro-mechanical machine which prints out invoices, summaries, accounts, reports etc. on continuous stationery in as many copies as are required. Modern printers are very fast – up to 1350 lines a minute, each line having up to 120 characters of type – but in some jobs this is the bottleneck which controls the overall job completion time.

Every computer has a console keyboard for putting special instructions directly into the processor or getting data directly out. This avoids punching cards and feeding them in via a card reader, but is very slow, since data or instructions have to be keyed in like a typewriter.

Other forms of direct input have been developed to avoid the punching operation. Banks in some countries have long used magnetic ink character recognition (MICR) for sorting cheques and posting them to customer Cheques are pre-printed with serial number, customer's account number, and bank branch number in magnetic ink. The amount written is also entered in magnetic ink. Cheques can then be sorted by branch and account number at high speed and the correct accounts posted. More recently, optical character recognition The present optical character readers can recognise characters printed in a suitable type fount in pre-determined positions on standard size documents, such as cash register tapes. Over 100,000 characters a minute can be fed directly into the processor. These machines are expensive (say Rs. 1 million) but will inevitably become cheaper and also will become increasingly able to recognise a variety of type founts and even handwritten documents, thus finally obsoleting the punched card.

This is not the end of automation, but only the beginning. The question may be asked, why is it necessary to write input documents at all? Advanced EDP users employ various types of automatic data collection equipment. Machine-actuated contacts record production as it occurs and transmit the information via teleprocessing equipment to a central computer. Other devices automatically record events in purchasing, receiving, stores inspection and despatch. The accounts can be kept continuously up-to-date, and the position of the company at any time can be found either by print-out or by other output devices such as video screens.

(ii) What does the computer do?

A computer can do any job that can be programmed, that is, that can be specified exactly in writing. For instance incentive pay calculations may be very complicated with numerous exceptions, but since it is possible to express the rules or formulae for calculation, it is possible for the computer to follow them. On the other hand, if the job or decision demands the application of rules which cannot be precisely specified, such as higher policy-making, the computer is stumped.

A great deal of time has been wasted debating whether a computer can think. A computer designed for commercial data processing "thinks" in the same sense that a refrigerator switches off the power when its thermostat tells it that the temperature is low. The "decision" to switch off is built into the machine by the designer. Similarly computer decisions are built into the programme by the systems designer and programmer. In fact, so far is the computer from thinking in the ordinary sense, as shown in popular cartoons, that many programs fail because the programmer overlooks the obvious. It is obvious to him, but the computer has to be told everything. It will then carry out those instructions with speed and accuracy. It has been correctly described as a "supremely efficient idiot."

A computer may therefore be used in all routine accounting work (the commonest applications are payroll, invoicing, sales ledgers, and stores accounting), some higher accounting work, such as investment analysis, price analysis and budgeting), and a wide variety of operational jobs such as vehicle scheduling, stock control, production control, sales forecasting, etc.

At first, the computer was regarded solely as a fast calculating machine, a sort of super-printing-calculator, for the purpose of saving clerks from tedious routines. However, this is like using a high performance sports car to pull a plough; it can be done but is it not likely to be economic.

The modern idea is that computers should be used *primarily* to enable the facts of today to be known today, so that management can take action in good time and so reduce costs and increase profits. For instance a shoe distributor in the U.K. gets a weekly sales trend analysis in time to vary the production schedules for the following week; stocks are reduced to a minimum, thus saving interest on capital, rent and other overheads, and stock losses due to obsolescence. These more than pay for the computer.

Up-to-date information is at present the primary benefit. A secondary benefit of rapidly increasing importance is the use of the computer in planning. Many advanced EDP users have worked out the relationships of various factors that affect their profits, such as advertising, sales volume and mix, prices, costs, capital investment, and so on. These "models" of the firm are fed into the computer, which

can then calulate the effect on profit of changes in any of these variables. This is called *simulation* since the firm is simulated by a model. Simulation is not limited to overall profit planning, but is used in planning sales, advertising, production, stock ordering, factory and warehouse siting, distribution channels, construction projects, etc.

(iii) Cost of computers

It will be appreciated that to ask how much a computer costs is rather like asking how long is a piece of string, since, it depends on the particular configuration of machines required for a defined system of inputs and outputs. However it is possible to give *typical* costs of a small to medium configuration such as an ICL 1901A or IBM 360 Model 25. Costs may be divided between set-up costs (mostly capital expenditure, but also including some expenditure normally written off to revenue), and running costs.

Set-up	costs	Basic price	Freight & Insurance	55% FEEC premium	Duty	Total landed price
		Rs.	Rs.	Rs.	Rs.	Rs.
(a)	Hardware					
1X	Central Processor					
	(16K)	500,000	20,000	286,000	125,000	931,000
	Card reader	55,000	2,200	31,460	13,750	102,410
1X	Line printer	380,000	15,200	217,360	95,000	707,560
4X	Tape units	360,000	14,400	205,920	90,000	670,320
	Console	30,000	1,200	17,160	7,500	55,860
5X	Card punches	45,000	1,800	25,740	11,250	83,790
5X	Card verifiers	53,000	2,120	30,320	13,250	98,690
100X	Tapes (2400)	22,500	900	12,870	5,625	41,895
	Miscellaneous	85,000	3,400	48,620	21,250	158,270
		1,530,500	61,220	875,450	382,625	2,849,795
					say	2,850,000
(b)	Computer room-fa tioning and elect			biliser, air	-condi-	170,000
(c)	Sundry-staff recruitand programmir					
	conversion					10,000

Rs.

3,030,000

Running costs/year

(a) Salarie	2 Systems analysts 2 Programmers 2 Machine operators 10 Punch/verifier operators	mainly dependent on level of training and experience	say 150,000
	10 Punch/verifier operators	and experience	

(b) Depreciation 10% p.a. on Rs. 3,020,000 (N.B. The life of a computer, assumed here at 10 years, depends not on wear and tear which is negligible, but on obsolescence. The computer becomes obsolete when advances in computer technology make replacement economic or when the firm outgrows the computer, whichever is sooner. The critical factors are usually the expected expansion of the firm and of computer applications within the firm, the capacity of the computer and whether the capacity can be increased).

(c) Maintenance, say 4½% of basic price 70,000

(d) Sundry- cards (Rs. 16 per thousand), stationery, space costs (say 1000 sq. ft @ Rs. 1/50 per square foot per month), machine power (10 - 20 KW), lighting, insurance, etc.

30,000

302,000

Rs. <u>552,000</u>

Lump sum depreciation allowances are given on the hardware landed cost and computer room cost, but not on items not normally capitalised. The running costs are all tax deductible, except depreciation.

Instead of purchasing a computer outright it is usually more economic (in Ceylon at present) to rent it, or to use a service bureau. If it is rented, the firm must still pay the freight, insurance, FEEC premium, duty, computer room and sundry set-up costs at the outset, but the basic hardware price is converted to a monthly rental (usually 1/40th to 1/50th of the basic price). This rental includes maintenance; no separate maintenance contract is required. Other costs are the same, except that on a rental contract, any usage of the computer over 176 meter hours a month (equivalent to about 250 hours actual usage a month) is charged additionally at a fraction of the basic rental.

If computer time is hired from a service bureau it is charged by the hour, say Rs. 450/hour, (most jobs take minutes rather than hours). Alternatively, a service bureau may be asked to take over complete responsibility for particular computer applications*. In this case, the bureau will first make a feasibility study and produce a systems definition. This is likely to take two to three months of systems analysis and programming and a onetime charge is made (in Rs. 000). If the firm decides to go ahead, the initial files must be set up, stationery re-designed

^{*} This is the best way of starting for a firm with little or no computer experience, since it acquires experience without the burden of capital expenditure and risk.

for easy punching, clerks trained to fill them in correctly, etc. The bureau undertakes this for an implementation charge (in Rs. 00). Finally a running charge is made for punching cards from source documents, processing them, and delivering the required reports at the required times. This charge depends on the size and complexity of the job. A payroll may cost Rs. 0/25 - 1/00 per man per week (if paid weekly) or per month (if paid monthly). Stock transactions may be processed at 5 to 10 cents per stock item per run (irrespective of the number of receipts and issues). Apart from the bureau's charges, the firm must purchase its own stationery and re-train any displaced staff, but it avoids all the heavy expenditure listed above.

(iv) Feasibility study

Before getting a computer, management must systematically study its aims, objectives and procedures with a view to justifying the need for a computer. A feasibility study is an attempt to justify the use of a computer as a tool of management in carrying out specified jobs. Too often computers are obtained on a "policy decision" of top management without the hard work of a feasibility study. The prospective user often spends a great deal of time learning what the computer can do for him, but frequently he will reach a decision while still grossly ignorant of the many services he must perform for the computer! There is still an aura of magic about the computer, which is supposed to solve problems "at the touch of a button." In fact the problems must be solved before the button is touched. Management consultants in the U. S. have estimated that 2 computers out of 5 do not repay their costs, and this is mainly due to inadequate feasibility studies and inadequate pre-installation preparation.

To justify a computer it is necessary:

- (a) to identify jobs that can be computerised,
- (b) to outline a plan for computerisation,
- (c) to develop the best alternative manual or less mechanised system,
- (d) to compare the computer with the best alternative system, and
- (e) if the computer is preferred to show that the benefits are likely to exceed the total costs.

A feasibility study may be conducted in two stages – general and detailed. The general stage starts with a meeting of all affected, with a top manager as chairman and decision-maker. A computer specialist should be on the committee as adviser, and the committee needs the staff assistance of personnel experienced in O and M or systems studies. These staff review all activities which involve large amounts of data, extensive processing, large numbers of clerical staff, or problems such as backlog, overtime work, and delays in providing essential information. From their report, the committee selects areas for deeper investigation and decides on management objectives in those areas. It is very important that management objectives are determined by management, and not by computer specialists. The latter may be machine – oriented rather

than management-oriented. While their experience is a necessary ingredient in the planning, if management succumb to the temptation of leaving systems planning to them, the systems will be based on what machines can do rather than on what managers need. It is also necessary not to prejudice the feasibility study in favour of machines; in many areas manual systems will be cheaper and more flexible.

Another important consideration at this stage is the future of integrated data processing (IDP) in the firm. This concept is best explained by way of an example. If a customer orders certain goods, Credit Control department checks his credit, Invoicing department prepares an invoice and despatch note. Stock Control department updates the stock records and re-orders the item if the level is low. Accounts department debits the customer and credits sales account. Sales Office analyses the sale by product line etc. The danger is that each department's work may be separately mechanised. Each of the above operations is in fact an aspect of a single sale. The aspects are divided between departments only because no one man can control them all. But a computer can do all of the above operations simultaneously from a single input or "common data base". This is the integrated approach which gets the greatest benefits from a computer. Piecemeal mechanisation merely reinforces the existing organisation.

On the other hand, IDP makes bigger demands of management and systems staff. No company to date (1970) has achieved total IDP. In selecting areas for computerisation, while an inter-departmental approach is essential, it is also important for the company not to bite off more than it can chew.

The *internal control* requirements of the auditors (both internal and external) should by checked with regard to the alternative systems under consideration.

The committee will then prepare terms of reference for a systems study in the selected area(s), decide on the personnel to carry out the study, and advise all staff of the purpose of the study and ask for cooperation.

The detailed systems study should be conducted by full time analysts with O and M or systems experience. They should analyse the present system, develop the best manual system, develop the best machine system, compare them and report comparative costs and other advantages/disadvantages to the committee. The study should be properly documented and referenced, since it will be used either as the basis for a systems requirement on which manufacturers will be invited to tender or, if the decision is not to computerise, the alternative manual system developed will be a readymade blueprint for administrative improvement. Either way, the systems study pays for itself and should not be skimped. It may be expected to take several months, and a major area may require five or more man-years of analyst time.

The investigation of the present system should start at the level at which work is actually done, since it is rare to find managers or supervisors who know exactly what is happening below them. Often the worker finds a better way than he has been told; often also, the worker does a lot of unnecessary or duplicated work of which his superiors are unaware.

The development of a new system is not difficult once the required output and constraints are completely understood. The output leads back logically to the required input data and a simple manual or machine method of obtaining, sorting, calculating and re-arranging the data. The costs and benefits of a computer system will be calculated on the basis of a proposed timetable of ordering, pre-installation training, programming, computer room preparation, etc., installation and parallel running with the existing system.

If the committee approves the computer system, the next step is to invite computer manufacturers to tender proposed machine configurations which will meet the system parameters, that is, requirements such as input and output volumes, timing and format, files to be maintained and exception provisions.

If the firm does not have experienced systems analysts, it should hire management consultants to assist in the feasibility study. This has the advantage of greater objectivity; systems analysts within the firm will tend to be pre-disposed towards a computer since this will make their own jobs more challenging and interesting. It is still imperative that management participate closely in the study. Computer manufacturers or service bureaus may be brought in to assist in the formulation of a computer system; naturally they cannot be expected to formulate a manual system.

(v) Evaluation of tenders

Computer manufacturers will often require further discussion and clarification of the system requirements. Variations in the requirements or in the weight attached to particular factors as between competing manufacturers, may be avoided by appointing a representative of the firm, e.g. the head of the study team, as the sole channel of communication, and arranging discussions with all concerned at the same time.

Assuming that competitive tenders have been sought, the firm then has to evaluate them. This means, first, checking that each proposed configuration will meet the system as defined, second, ascertaining differences in total, cost, reliability, service, compatibility with larger models, etc., and lastly choosing between them. The main difference between proposals is not likely to be in the hardware (cost/performance ratios are broadly similar in each generation), but in the software provided. This should be evaluated by an independent expert. The total cost will include not only the machine cost, but all the associated costs, including costs that are not paid to the computer manufacturer (such as computer room preparation costs and staff salaries) for the full expected period of use. It is important to realise that the cost of machines may

be only half the total cost of the system; a comparison of tenders merely on the quoted machine prices is bound to be misleading.

Most computers can be rented as well as purchased so the choice is not only between computer configurations but also between purchase or rental. The successful tenderer is informed, then a contract based on the tender is drawn up and signed.

(vi) Pre-installation preparation

Between order and delivery there is usually a period of at least 12 months. This is often not long enough for all the detailed preparation necessary. Delivery should not be accepted before completing the following:

Selection and training of Data Processing Manager, systems analysts, programmers, machine operators.

Preparation of computer room, tape and card stores, punch room and accommodation for DP personnel and maintenance-engineer.

Support training for staff concerned with input data. Computer appreciation for output users and general management. Staff indoctrination and familiarisation at all levels.

System study and definition (if not already completed for initial computer applications). Programming. Documentation. Preparation of test data. Programme test. File conversion.

A Steering Committee should be appointed to plan and control these preparations. Network analysis may be used. The Committee often consists of the heads of major departments which will be using the computer, representatives of the auditors and the computer manufacturer, and the DP Manager when appointed.

(vii) Selection and training of DP Staff

The computer manufacturer will provide considerable assistance. For instance, in the selection of DP personnel, manufacturers have aptitude tests designed to establish whether applicants have the right mentality for the exacting requirements of DP. There are two methods of staffing. One is to hire computer experts and teach them the firm's business. The other is to select employees with aptitude and send them on the manufacturer's training courses. Many favour the latter. Manufacturers also provide high level appreciation courses for top management.

(viii) System study, flowcharting and definition

The system study begun as a feasibility study results in a system definition. This is a document prepared by the systems analyst heading the study and accepted by the chief programmer as containing all the

information required to write a workable set of programs. The form of the document varies from one firm to another. For instance, in ICL the systems definition has 10 sections:

- 1. Preliminary information
- 2. The aims of the system
- 3. Detailed systems description
- 4. Changeover procedure
- 5. Equipment utilisation

- 6. Source document specifications
- 7. Printout specifications
- 8. File specifications
- 9. Descriptions of the systems test data
- 10. Program descriptions

The detailed systems description contains flowcharts and narrative for the clerical procedures, data preparation procedures, computer processing (broken down by run), and report distribution procedures. Section 10 will describe the purpose of the program to be written for each computer run, the processing that will take place, the various control checks, and error procedures.

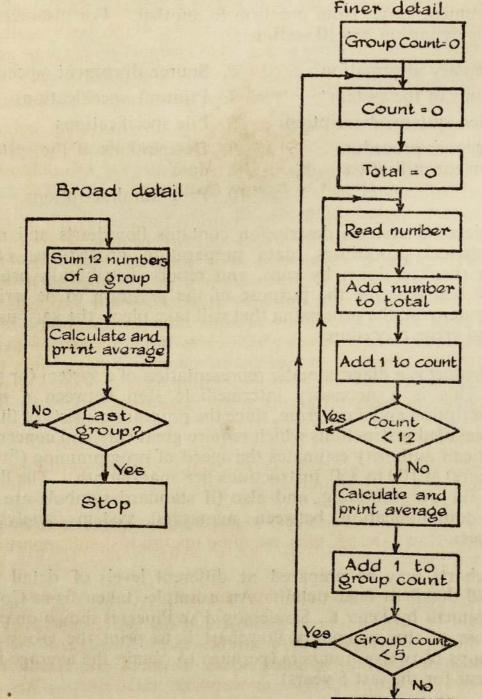
A flowchart is a diagrammatic representation of a system (or part of a system). This is a necessary intermediate step between a narrative system description and a program, since the program consists of thousands of highly detailed instructions which require great care and concentration. One American authority estimates the speed of programming (by trained programmers) at 100 to 350 instructions per man-month. The flowchart is a basis for programming, and also (if standard symbols are used) a basis of communication between managers, systems analysts, and programmers.

Flowcharts may be prepared at different levels of detail working from broad detail to finer detail. An example (taken from Computers for Management by Peter C. Sanderson, Pan Piper) is shown on page 596. The purpose of this imaginary flowchart is to print the group average of five groups of twelve numbers (perhaps to obtain the average monthly cost per year for the last 5 years).

Note in this example that the steps of reading a number and adding it to the total are written only once, though they are to be followed twelve times. This is accomplished by the decision operation (is "count" less than 12?); if it is still less than 12 the computer is switched back to the earlier point and goes through the loop again. The same loop technique is used, for example, in a payroll routine for 10,000 employees; the instructions need only be written for one employee. This saves core store as well as programming effort.

(ix) Programming

From the system definition and flowcharts, the programmer has to write individual machine – recognisable instructions. A typical machine code instruction consists entirely of numbers, e.g. on one computer, 04 300 means add into the accumulator the contents of store location 300. This is difficult to read and mistakes are inevitable.



The job is made easier by writing the program in an autocode language then using a compiler supplied by the manufacturer to translate the autocode into machine code. The translation is done automatically by the computer, which then follows the machine instructions.

Stop

There are two kinds of autocode – assembly languages and "high-level" languages. High level languages more closely resemble mathematical or natural languages and are easier to learn, though assembly languages tend to use less store and less computer running time. Commonly used assembly languages include PLAN (ICL 1900 series) and Usercode (ICL System 4). Commonly used high level languages include Fortran, COBOL, PL/1 and RPG. Fortran (formula translation)

is more generally used on mathematical work. COBOL (common business oriented language) is widely used for commercial data processing. PL/1, recently developed by IBM, is designed for both mathematical work and commercial file-processing. RPG (report programme generator) is another IBM language intended for obtaining reports and analyses in any desired format from data in storage.

Massive research goes into developing programming languages as the difficulty communicating with computers and instructing them what to do is the main limiting factor in the rate of growth of computer usage. Major languages are subject to regular maintenance and review.

The software supplied by the manufacturer consists of compilers as mentioned above, diagnostic programme for locating errors in program testing ("debugging"), engineering test programs for the hardware, subroutines for standardised jobs within a programme such as sorting records into order, packages for specialised standard applications such as critical path analysis, solution of simultaneous equations, regression analysis, etc., operating systems which carry out a number of checks and housekeeping functions common to all computer runs, and executive or supervisory systems for multi-programming, that is, where the processor is handling two or more programs at the same time.

(x) Documentation

At every stage it is necessary to keep a careful record to facilitate program testing and amendment.

Procedure manuals (standards manuals) must also be written detailing the document flow, timing, files, machine operations, and report distribution for each job.

(xi) Preparation of test data and program test

It would be very unwise to assume that the system and program will work first time. Normally a program has to be "debugged" by applying it to artificial test data, compiled so as to check the reactions of the program and system to every conceivable condition. This is done before the delivery of the computer so that system/program corrections do not waste costly machine time. Testing is done on a similar configuration installed elsewhere by arrangement with the manufacturer; usually a certain amount of test time is included in the machine price.

(xii) File conversion

This means creating a set of files, usually on magnetic tape or discs, containing all the standing data, opening balances, etc. that will be required by the system. If the existing files are manually kept, data must be punched into cards, checked and edited, then transcribed onto tape or discs. If the existing system is on punched cards, the job is easier.

(xiii) Site preparation

The computer and magnetic tapes and discs are very sensitive and have to be kept within a narrow range of temperature and humidity in

an entirely dustfree environment. Other DP working areas such as the data preparation room (punch room) may also be air-conditioned for convenience and comfort.

The computer room will need a false floor to reduce vibration and get cables out of the way. Also a voltage stabiliser is necessary, otherwise variations in the voltage of the power supply will cause malfunctions.

(xiv) Support training

It is often forgotten that the successful running of the computer will depend on accurate and timely input. This requires specific training in clerical areas responsible.

(xv) Personnel policy

The popular idea of the computer is that it is a labour-saving machine, putting masses of labour out of employment. This is the reverse of the truth since, at the present stage of development, it needs more staff than it replaces. However there is displacement of staff from one occupation to another; there is often a general upgrading of staff. It is very important to explain at an early stage exactly what the computer will do and how each person will be affected so as to remove unnecessary fears and create a climate of co-operation.

Normally a growing firm can absorb displaced staff into other areas without difficulty and a guarantee can be given at the outset that no-one will be made redundant. A careful analysis should be made of the re-training needs of displaced personnel.

(xvi) Installation and Parallel running

The physical installation of the computer may require outside contractors. The manufacturers advise and assist. Installation of a small to medium sized computer might take a week. On completion, the machines are put through a series of acceptance tests previously agreed with the manufacturer.

New systems always have teething troubles, so the old system is not immediately discontinued but run in parallel until management are confident in the new system. In the financial evaluation, savings should be delayed at least 6 months to allow for parallel running.

(xvii) Organisation of the DP function

In a large firm, DP is a management service, like operational research work study, and management accounting. The DP manager reports directly to the chief executive (managing director) and is thus not subject to any single function such as accounting, or sales.

In the smaller firm, DP is often first placed with the major user of the service, such as the Chief Accountant. However DP is not part of accountancy; accountancy is a part of DP or management information systems generally. It is important to avoid confining the computer to accounting operations but to use its potential in operating areas such as inventory and production control.

Wherever DP is placed in the organisation, criteria for accepting computer jobs, and priorities in dealing with approved jobs, should be clearly defined, remembering that DP is often a cause of inter-departmental conflict.

The department may be broken into three main sections – systems analysis, programming, and operations. The systems analysis and programming sections have a continuous function of developing new computer applications and maintaining and improving existing applications. Operations include data preparation, control (e.g. taking batch totals), machine operations, and tape/disc storage.

8.25 MECHANISATION

Mechanisation, the replacement of labour processes by machine processes, is a matter of degree rather than all-or-nothing. However, in the literature on accounting systems, the term "mechanised accounting" is often restricted to book-keeping machines, punched card systems, and computers; a system may employ add – listing machines, desk calculators, cash registers and other aids, and still be called a "manual" system.

The general advantages of mechanisation are as follows:

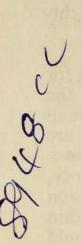
- (i) speed. A given volume of work is completed sooner. This has two important consequences. First management get essential information for control and decision-making sooner. Secondly, time costs such as salaries, overheads and interest on capital are reduced.
- (ii) accuracy. Not only is the work completed sooner, but it is completed to a higher level of accuracy and reliability. Accounting equipment is almost always mechanically reliable, and if a machine does break down, it is usually obvious. Human beings are prone to error, and the errors are not always obvious. It should be noted that mechanised systems still depend on human input and controls; therefore their output (and its interpretation) are still subject to human fallibility only some sources of error are removed.
- (iii) *legibility* and uniformity of records.

 This contributes to speed and accuracy, and also assists the auditors.
- (iv) release from tedium. The labour processes mechanised are usually those that are most routine and repetitive, with least discretionary content. Labour is released from drudgery and, assuming a growing firm with good personnel management, is re-trained in new skills. It is true that some machines have created new forms of drudgery (machine operators, "pullers" and "stuffers") but in general the total amount of such work is reduced, and labour is up-graded.

- (v) clerical discipline. A well-planned system requires its inputs at scheduled times. This imposes a discipline on the sections responsible for data preparation, a discipline which may be unfamiliar and unwelcome. However whether this is claimed as an advantage or a disadvantage, it is also true of a well-planned manual system.
- (vi) reduction in peak loads associated with conventional manual systems, e.g. preparation of ledger statements at the end of each month.

Disadvantages are:

- (i) capital cost in a capital-scarce economy. Also equipment is usually imported, so this is a foreign exchange cost. (From a social cost/benefit point of view, the cost to the economy is higher than the official rate of exchange, plus FEEC premium, since this is a controlled rate which does not fully reflect the scarcity of foreign exchange. Also the true economic cost of labour which would otherwise be unemployed or underemployed is less than the wages saved. Thus the economic justification of imported equipment is far more difficult than in a hard currency, full employment economy).
- (ii) fear of change is a normal human reaction at all levels. At the clerical level there is possibility of redundancy. Even if the firm has a no redundancy policy, there may be fear of loss of status, loss of freedom by being tied to a machine, etc. Mechanisation is sometimes regarded as the "final solution" of labour problems; on the contrary, it may add considerably to them.
- (iii) training. Most machines need trained operators. Computers need also punch operators, systems analysts, programmers and related skills.
 - Displaced staff may need to be re-trained.
- (iv) loss of flexibility. A clerk can vary his pace, alter the sequence of operations, recognise priorities and spontaneously adapt to them to a certain extent, and spot obvious errors in the data. A machine operator is trained only to operate the machine and is not so versatile. It has been truly said that a well-trained clerk is the most versatile machine on the market. Investment in clerical training and office methods is always an alternative to investment in machines.
- (v) risk of breakdown. A mechanised system, especially a small one, is more vulnerable than a manual system. Absence of the operator, mechanical breakdown or power failure mean that the machine cannot be used, whereas in the absence of a clerk, his work can usually be covered by another. (It is usually necessary to have three operators trained for a one-machine installation to allow for one on leave and one sick. A prompt maintenance service is also necessary).



(vi) inaccessibility of data. Machines are usually centralised in a separate department to obtain the economies of pooling. Source documents such as supplier invoices, sales invoices, receipts, etc. have to be batched, coded and sent to this department for processing. It is either difficult or impossible to refer to the documents until they are returned. Nor is it usually possible to alter incorrect source data once it has been prelisted, since this would unduly complicate the system of controls; corrections have to be put through as further entries.

In punched card and computer systems, unprogrammed information needs may be met only by interpreting punched cards, or by arranging a print-out from magnetic tape.

The evaluation of a proposed system should be made by comparing its cost with the cost of a good manual (or less-mechanised) system, not with the cost of the system in being since the latter is not usually a norm or standard. "Cost" means total costs of equipment, training, stationery, maintenance, power, salaries, overheads, taxes (less tax allowances) interest on capital, and any other item, which differs between the two alternatives, for the full expected life of the equipment (see example in section 3.9).

Allowance should be made for differences in benefits such as improved managerial control. The larger the proposed expenditure the more important it is to identify such benefits explicitly, and "to turn figures of speech into figures of arithmetic". For instance, if a sales ledger system is expected to improve credit control, the cash value of this is a saving in the cost of capital by reduction in the level of debtors, and perhaps some avoidance of legal costs and bad debts. It is necessary to understand clearly how these savings will arise, how much they are likely to be, and the order of magnitude of possible error.

It is still commonly said that it is not possible to evaluate control benefits (especially by those who have a vested interest in machines irrespective of their economics). In fact it is often possible to express the order of magnitude of possible savings e.g. stocks are commonly reduced by 20%-50% by modern methods of stock control. If management cannot even estimate the order of magnitude of savings, the management accountant may present information in break-even form, e.g. the computer will repay its costs if it reduces total administration costs by x%. The likelihood of this can then be judged by the decision-maker. This financial discipline is still rare, but the evidence is that it is a distinguishing characteristic of firms in which advanced information technology is made to pay.

The evaluation of a machine should depend on its costs and benefits, not on the level of utilisation. It is not a legitimate criticism that a machine will be used only 10% of its time, where the savings from even this low utilisation outweigh the costs. Telephones, for instance, have low utilisation, but this is irrelevant, since the value of time saved by not having to write letters, make visits, etc. outweighs the cost. (It would

be legitimate criticism if a machine were to be used full time, since this would leave no reserve for emergencies or expansion).

If the business already has machines, spare capacity may be used for mechanising further routines. The cost of using this capacity is the marginal cost of extra stationery, power etc. This is usually very small in relation to full costs, since the main costs of a mechanised system are fixed (depreciation, and interest on capital). If the total demands on a machine exceed its capacity, demands should be met in order of priority, judged in terms of benefits per hour of machine time. A common situation is where the spare capacity is expected to be absorbed within the foreseeable future; in this case potential users of the machine should be required to show benefits equal to the full cost, not marginal cost.

Internal control

Mechanisation of a system does not affect in any way the principles of internal control, though it will affect their application. For instance, internal control on credit sales requires, inter alia, that all invoices are debited to the respective customers' accounts. In a book-keeping machine system, copy invoices are debited one by one to customers' accounts, and a carbon copy is made on a backing proof sheet of all debit entries. The total of all debits is accumulated in the machine and is posted to a control account. If the total of resulting balances on customers' accounts agrees with the balance on the control account, it is certain, apart from the possibility of compensating error, that all invoices have been debited. There is no guarantee, however, that the correct customers have been debited.

In a manual system, the same sort of control account can be debited from a pre-list of invoices, or from the sales day book. It is still, however, only a control in total. The risk of posting to the wrong account may be reduced by keeping the ledger in strict alphabetic order, and by sorting copy invoices systematically into the same order.

Careful consideration should be given to internal control in the design stage of a mechanised system. The main additional considerations are as follows:

- (1) the ledgers consist of loose sheets or cards, which may be abstracted for forging, or substituted altogether, more easily than with bound books,
- (2) carbon copy entries may be faked, though it is more difficult to alter machine-made entries than handwritten entries,
- (3) greater attention should be paid to ensuring that all prime documents enter the system, e.g. by serial numbering,
- (4) prime documents should always be pre-listed on an adding machine; prelists and proof sheets should agree,

- (5) less attention need be paid to the correct totalling and balancing of accounts,
- (6) the correct pick up of existing balances on accounts is usually ensured by a system of double pick up; this is adequate provided the balance is not wrongly picked up twice,
- (7) in a punched card system, punched cards should always be verified,
- (8) more transmission of documents, e.g. to and from the machine room, allows more scope for alteration and substitution.

8.26 ACCOUNTING MANUALS

An accounting manual sets down, clearly and concisely, the responsibilities of employees for all aspects of budgeting and accounting. It is generally prefaced by a short statement that personnel are expected to follow the procedures prescribed.

Its purpose is to ensure consistency and uniformity in procedures, partly to preserve internal controls, and partly to gain the advantages of standardisation. If clerks are transferred between departments or even divisions, they can expect to find the same procedures in operation.

The accounting manual is not only a tool of control, it is also a training aid, especially for induction training. When there is any *change* in the accounting system, for instance on the introduction of budgetary control, or standard costing, it is essential that all levels affected clearly understand their new responsibilities; implementation is made much easier by written procedures. A well-written manual is also a means of "selling" a new system to top management.

Contents

- 1. Explanation of purpose of budgeting and accounting (information for planning and control).
- 2. The accounting year (usually timed to end at a slack period, or when stocks are easy to count or to gain maximum tax credit).
- 3. Schedule of cost centres with the titles of the responsible heads, their code numbers, and details of their functions and responsibilities, delegation of responsibility for authorisation and approval of payments, signing cheques etc.
- 4. Schedule of accounts required for regular management reports and to satisfy legal and tax requirements, and their code numbers, and details of what items go into each account.

5. A chart of accounts showing what accounts would be used in each cost centre, e.g.

Cost Centres Accounts	Prod'n. Dept.A		Power House		Plant Maint.	Canteen	General Admin.	Sales Branch Kandy	Etc.
Salaries	1				V	V	V	V	
Wages	V	PIE	V	polit i	V	V	1	-	The same
Overtime	V		1		1	V	1		
Commission	-		_			_	_	V	
Raw materials	V		V		-			-	A DEL
Maintenance parts	-				V			-	
Stationery	1		V		V	V	V	*	
Petrol, oil & lubr's.	1	Je Dys	V			-		V	
Insurance	-			20/10			V		
etc.									

- 6. Budgeting procedure, including timetable.
- 7. Procedure for each accounting routine, including sales debtors and receipts, purchases, creditors and payments, timekeeping and payroll, costing, stores accounting, and asset and depreciation accounting.
- 8. Management reporting procedure with specimen forms, addressees, and reporting dates throughout the year.
- 9. Interim and final accounts procedure, with skeleton accounts, showing the accounts codes for each item.
- 10. Date and author, with reference for further information or explanation. Sometimes a glossary of accounting terms is included.

An accounting manual must be kept constantly up-to-date otherwise it degenerates into a mass of separate unrelated circulars and instructions. Therefore it is kept in loose-leaf form, usually in a ring binder, and all amendments are written *into* the relevant procedures, and circulated to all manual holders so they may substitute amendments for the old sheets. Responsibility for the accounting manual is assigned usually to the financial accountant or management accountant.

8.27 ORGANISATION OF ACCOUNTING DEPARTMENT

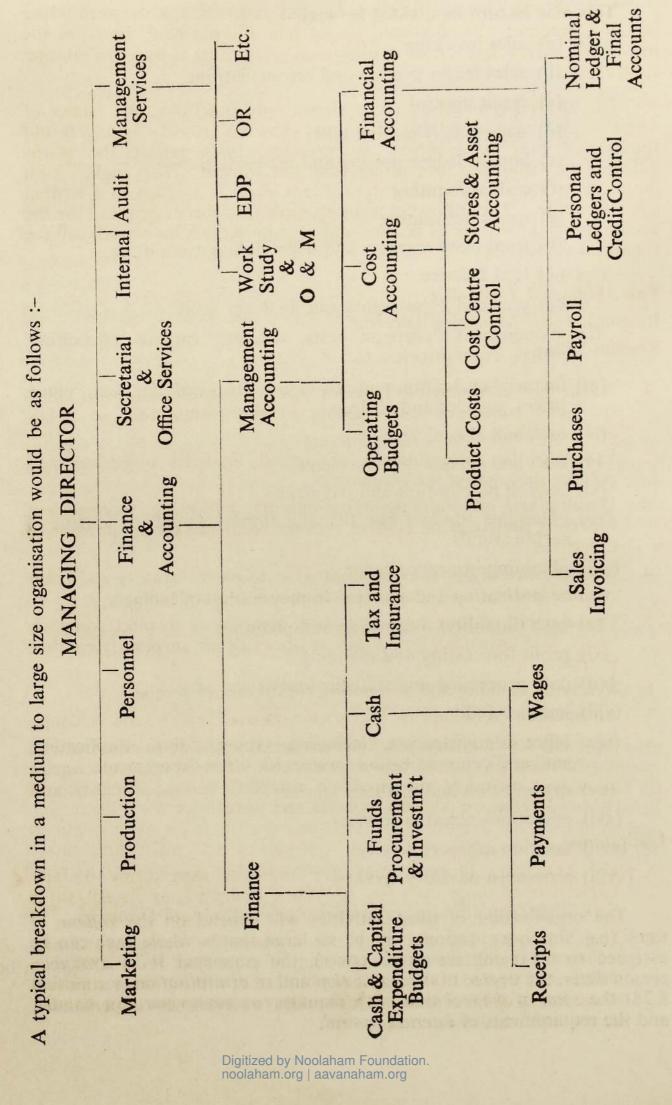
An accounting or finance department may be responsible for a number of quite different activities, including:

(i) book-keeping and final accounts (external reports) -

This may in turn be divided between -

- (i) (a) sales invoicing
 - (b) sales ledger posting and reconciliations
 - (c) credit control
 - (d) payments (checking bills)
 - (e) bought ledger posting and reconciliations
 - (f) cash accounting
 - (g) stores accounting
 - (h) fixed asset registers and depreciation accounting
 - (i) trial balance
 - (i) year end adjustments and final accounts.
- (ii) management reports on costs, revenue, capital expenditure, orders, commitments, etc.
- (iii) financial evaluation and advice on proposed projects, plans, prices, policies and budgets
- (iv) cash and cheque receiving
- (v) cash and cheque disbursements
- (vi) payroll preparation and payment
- (vii) obtaining funds from the capital market and investment of surplus funds
- (viii) obtaining insurance cover
 - (ix) co-ordinating and assisting in preparation of budgets
 - (x) cash (liquidity) forecasting and planning
 - (xi) profit forecasting and planning
- (xii) data processing and statistical services
- (xiii) internal audit
- (xiv) office administration, including typing, filing, duplicating, mail and communication services for other departments
- (xv) organisation and methods services
- (xvi) operations research services
- (xvii) taxation advisory services
- (xviii) economist advisory services

The organisation of these activities will depend on the volume of work (e.g. few organisations will be so large that a whole man can be assigned to arranging insurance cover), the personnel skills available, personalities, the degree of mechanisation and of centralisation (see section 8.28) the span of control that each manager or supervisor can handle, and the requirements of internal control.



Note that the finance function handles cash whereas the accounting function prepares sales invoices, passes bills for payment, prepares the payroll etc. This division of custody and accounting is basic to internal control.

The above organisation chart shows only functions; the names of departments and sections may differ, and the titles given to managers and supervisors may also differ. In practice, titles reflect the status differentials within the firm rather than job content. This makes it all the more important to specify the content of each position in a written job description. The following is an example of a job description for the person in overall charge of finance and accounting, whom we will call the Financial Controller:

Title: Financial Controller

Responsible to: Managing Director

Responsibilities:

- 1. Advising the Managing Director and in consultation with other functions concerned participating in the formulation of policy and objectives;
- 2. Ensuring the dissemination of agreed financial objectives and policies throughout the company;
- 3. Development of planning, programming, budgeting, management reporting and internal control systems to assure the attainment of objectives;
- 4. Maintenance of books of account so as to meet statutory and other requirements as well as internal company requirements;
- 5. Procurement of long term and short term funds to meet company needs, and investment of funds temporarily in surplus from time to time;
- 6. Receiving banking and accounting for all money received;
- 7. Authorising payments in line with approved policy and budgets;
- 8. Advising and assisting management at all levels as to the financial implications of current performance and future alternative courses of action, including the effect on company profits, liquidity and risk, of alternative projects, policies and prices.

Limitations

- 1. The Managing Director may not authorise expenditure on any single item of more than Rs. 100,000 if budgeted, or Rs. 10,000 if not budgeted, without prior approval of the Board of Directors.
- 2. The Managing Director may not commit the company to any recurrent expenditure on a single item of more than Rs. 10,000/year if budgeted, or Rs. 1,000/year if not budgeted, without prior approval of the Board of Directors. (This applies to recruitment of personnel, leases, hire purchase contracts, etc).

8.28 CENTRALISATION AND DECENTRALISATION

Centralisation means the retention of authority and responsibility at one point in an organisation, e.g. the Head Office.

Decentralisation is the specific delegation or assignment of authority and responsibility to operating units away from the centre.

In a one-man business all functions are centralised. In a larger business some functions will be decentralised while others are retained centrally. The decision on whether a particular job or function should be decentralised or whether it should be retained centrally depends on a large number of factors. The general advantages of decentralisation are as follows:—

- (1) reduced pressure of work at the centre; the time made available may be used for better strategic planning, review of control systems etc.,
- (2) decentralisation of responsibility gives heads of operating units a training in decision-making; this aids the development of future top management,
- (3) operating units have greater discretion and flexibility of response to situations; decisions are made without the delay of being referred to head office,
- (4) increased job interest and satisfaction at operating levels, causing higher productivity,
- (5) geographical extension of facilities, e.g. extra sales branches.

Disadvantages:

- (1) the benefit of higher level managerial skills and judgment are lost where these are concentrated at the centre,
- (2) difficulties of instituting satisfactory standards and measures of performance for supervision and control without interference or duplication of work,
- (3) loss of economies of scale, e.g. in purchasing,
- (4) loss of the advantages of pooling; more staff and equipment are required.

Mechanisation usually implies centralisation since it is more economic to send data to and from a central machines department than to put a machines section into each operating unit. For example, each one-machine section needs 3 operators to allow for one being on leave and one sick, but a centralised 10 – machine pool can probably manage with only 15 operators.

This is even more true where the equipment is a single large unit, such as a computer, rather than a number of machines which can be operated independently, such as accounting machines or typewriters.

Most financial accounting functions are centralised in all but the largest organisations, and the earlier tendency for greater decentralisation in large organisations is being reversed by the increasing use of large data processing equipment, better communications, more specialists at top level, and improved management techniques, such as management by exception.

Certain accounting operations are physically tied to other functions e.g. cash receiving is tied to sales outlets where cash sales are made. In this case, cash receipts are banked the same day for the credit of a central bank account so that cash balances are pooled and idle cash kept to a minimum. Cash from *credit* sales can still be centralised by requiring customers to send their cheques to a central office.

Purchasing is usually centralised to obtain better terms from suppliers and for purposes of internal control; however a certain amount of decentralisation is always allowed through the petty cash procedure and this may be increased to allow branches to make local purchases within certain limits where the delay from central purchasing outweighs its advantages.

Payroll preparation may be decentralised to units large enough to provide proper internal control by division of duties, but mechanisation usually makes decentralisation impossible or uneconomic. Making up pay packets is more often decentralised where units can obtain cash from local banks as this avoids expensive and risky cash transfers. This operation is not often mechanised (by the use of coin-and-note-counting machines) and may be decentralised even if the payrolls are prepared centrally.

Sales invoicing is usually centralised as this is a specialised job and requires good supervision and internal control. Sales ledgers must also be centralised, since credit control depends on centralising all information relating to each debtor.

Accounting functions such as financial planning and budgeting, cost and management accounting and internal audit exist primarily as staff assistance to managers at all levels, so can be decentralised wherever they can be fully employed to the best advantage. Of course many organisations will only have one man to provide all (say) management accounting services, so the question of decentralisation does not arise. In a large organisation, they may be organised in a structure parallel to the main line organisation. However the *co-ordinating* aspect of budget preparation, project evaluation, pricing, etc. must be centralised.

Certain general clerical functions such as typing, duplicating and filing are often centralised or pooled. The general advantages of centralisation of these services are:

(i) they become the full-time specialisation of a few employees instead of a part-time chore for large numbers of clerks, secretaries, etc. who feel that they have more important things to do; this raises productivity and quality standards,

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- (ii) centralisation makes it economic to hire supervisors, purchase special equipment (e.g. electric typewriters, dictating/machines) provide training, etc. since these expenditures will be more fully utilised than if the service is scattered over many points,
- (iii) the amount of typing etc. at each work point varies from day to day and from hour to hour. Sufficient typists etc. must be hired to be able to cope with the peak workloads, subject to the possibility of working overtime, or letting work pile up temporarily. Pooling variable workloads results in a total workload which varies less, since some peaks are cancelled out by troughs. Thus fewer typists, etc. are required for the same volume of work. (A pool can work overtime or allow a backlog of work to the same degree as a decentralised service so there is a real clerical saving).
- (iv) proper working conditions can be planned.

Disadvantages are:

- (i) possible remoteness from users of the service, leading to delays and misunderstanding of requirements. The *degree* of centralisation is important. Normally an office service should remain in the same building as its users; if the organisation is spread over a number of buildings, a pool service should be provided in *each* building where the workload is high enough to secure the above advantages,
- (ii) clashes on priorities where a pool services several departments,
- (iii) special provision must be made for confidential work, e.g. this may be done by the supervisor,
- (iv) if managers have had these services provided by personal secretaries, often pooling leaves insufficient work to justify retaining secretaries, except at top management level; the move is seen as reducing their status and is therefore resisted.

Instead of physical centralisation, the service may be provided on a decentralised basis but with central control and co-ordination. An office manager may be appointed to recruit, train, motivate and control the work of typists, filing clerks, duplicating machine operators, etc. who may be located in or adjacent to the main user departments. This achieves most of the advantages of centralisation and avoids some of the disadvantages.

8.29 USE OF STATISTICAL SAMPLING THEORY IN MANAGE-MENT ACCOUNTANCY

Statistical sampling is a means of estimating some desired information about a large number of items without examining all the items.

Most financial accounting operations aim at 100% accuracy by taking a 100% sample. For example, sales for the year are obtained by

adding all the invoices issued, since auditors would not accept an estimated figure. However managers do not need such accuracy for planning or control purposes; usually 95% or 99% accuracy is quite sufficient.

This allows the management accountant to produce far more useful and early information at far less cost, since acceptable accuracy can often be achieved on quite a small sample.

The size of the sample depends mainly on the degree of variation in the item being measured. If sales invoices were nearly all between, say, Rs. 20 and 30, the average amount could be found on a much smaller sample than if they varied, say, from Re. 1/- to Rs. 1000/-. Notice that the size of the sample does not depend on the number of items. The same accuracy is achieved by sampling a 1000 invoices out of a million, as 1000 out of 10,000. This is emphasised as it is often thought that the level of accuracy of an estimate depends on the proportion of the total "population" sampled; it depends rather on the absolute number of items sampled, and the degree of variation, not on the number in the total population, or the percentage proportion of the sample to the total.

The desired information may be an amount or a proportion.

Examples of amounts are:

- (i) the average amount of an order, invoice, stock requisition, etc. (from which the total orders, sales, issues, etc. can be found by multiplying by the total number of such documents).
- (ii) the number of items listed on the average order, invoice, requisition etc.
- (iii) the annual cost for each type of vehicle from a large fleet.

Before showing how to estimate an amount it is necessary to explain the meaning of statistical accuracy. There are two elements in this precision and reliability. The result of a sample might be expressed: average invoice value is Rs. 182 plus or minus Rs. 10 for a 95% confidence level. This means that if 100 samples were taken, the average of each sample would be between Rs. 172 and 192 (precision) 95 times out of 100 (reliability). This is equivalent to saying that we are 95% confident that the average of all invoices is between Rs. 172 and Rs. 192. For any given sample, precision and reliability are inversely related; the same result could be expressed: average value is Rs. 182 plus or minus Rs. 13 for a 99% confidence level, or Rs. 182, plus or minus Rs. 16/50 for a 99.9% confidence level. If we need a more precise answer without sacrificing reliability, this is achieved by increasing the number in the sample.

The first step is to take a random pilot sample of at least 30 and calculate the sample mean and the estimated standard deviation of the population, as follows:

Invoice value			Square of	of invoice value
(X)				(X2)
150				22,500
185				34,225
175			* (20);	30,625
150				22,500
150				22,500
175				30,625
180				32,400
150				22,500
160				25,600
175				30,625
150				22,500
100	****			10,000
150				22,500
150				22,500
180				32,400
150				22,500
175				30,625
145				21,025
180				32,400
150				22,500
170				28,900
150			• •	22,500
150				22,500
145) * 1 • 1			21,025
150				22,500
165				27,225
180				32,400
140	• ::•:			19,600
150				22,500
160	• (•			25,600
4740	•	••		757,800
				De Transport

(Some desk calculators will accumulate both the invoice values and their squares in a single run).

The sample mean is given by $\frac{Ex}{n}$ where Ex (described as "sigma x") means the sum of the values of x, and n is the number in the sample. Sample mean $=\frac{4740}{30}$ = Rs. 158. This is the best estimate of the average value of all invoices. The rest of the calculation is concerned only with how accurate this estimate is.

The estimated standard deviation of the population is a measure of how far invoice values vary from the mean or average, and is given by –

$$\sigma = \sqrt{\frac{E(x^2) - n \left(\frac{Ex}{n}\right)^2}{n-1}}$$

(σ is the small Greek letter sigma, and is always used to denote the standard deviation)

Therefore
$$\sigma = \sqrt{\frac{757,800 - 30 \left(\frac{4740}{30}\right)^2}{29}}$$

$$\sigma = \text{Rs. } 17/50$$

From our pilot sample of 30, we can say that the average invoice is between Rs. $158 + (2 \times 17/50)$ and Rs. $158 - (2 \times 17/50)$ to a 95% confidence level, or that it is between Rs. $158 + (2.6 \times 17/50)$ and Rs. $158 - (2.6 \times 17/50)$ to a 99% confidence level. (The factors 2 and 2.6, more accurately 1.96 and 2.58, are constants applying to all normal distributions where the number in the sample is not very small).

The precision of this result is not very high, even at the lower level of reliability. Suppose we would like an average value within plus or minus Rs. 10 at the 99% confidence level, the size of the sample must be increased to n, where

$$n = \left(\frac{2.58 \text{ s}}{10}\right)^{2}$$

$$= \left(\frac{2.58 \times 17.50}{10}\right)^{2}$$

$$= 204 \text{ (rounded up to the next whole number)}$$

Therefore, a further 174 invoices must be sampled at random, and the mean and standard deviation re-calculated for the combined sample of 204 invoices. This will give a new estimate of the population mean within approximately plus or minus Rs. 10, to a 99 % confidence level.

For an estimate within say \pm Re. 1/- at 99% confidence level, the number in the combined sample must be $\left(\frac{2.58 \times 17.50}{1}\right)^2 = 2038$

Where the desired statistic varies more widely n will be high and it may be found physically impossible to take the sample required by the formula, either because it would take too long or even because n exceeds the number of items in the population (in the latter case of course a 100% count will give complete accuracy, subject only to clerical errors).

A similar approach applies to ascertaining the true proportion in a population having some defined characteristic.

Examples of proportions are:

- (i) the percentage of orders, invoices, requisitions, etc. for more than Rs. 100 (or any other critical amount)
- (ii) the percentage utilisation of equipment
- (iii) the proportion of time spent by personnel in each of a variety of tasks
- (iv) the proportion of incoming invoices with mistakes
- (v) the average error in stock records as a proportion of the book value of stocks

The formula for a proportion is as follows:

$$P = P_s \pm 2 \sqrt{\frac{P_s (100 - P_s)}{n}}$$

where

P is the true percentage P_s is the percentage in the sample and n is the number of items in the sample.

(The number 2 appearing in the formula reflects a 95% confidence level in the result. If a 99% confidence level is desired, substitute 2.6 for 2. This of course reduces the precision of the answer).

Example: what percentage of time is a typewriter actually in use? On 600 snap observations at random intervals, the typewriter was in use 240 times, i.e. a sample proportion of 40%.

$$P = 40 \pm 2 \sqrt{\frac{40 \times 60}{600}}$$
= 40 + 4

i.e. the true proportion is between 36% and 44% to a 95% confidence level.

It is very important that a sample is taken at random. This means that every item in a defined population must have an equal chance of being included in the sample. This can never be achieved where human beings are deciding which items to sample. Even if there is no obvious bias towards these items which are most convenient to the chooser (e.g. the invoice files nearest to hand, or omitting randomly selected invoices where these are missing from the files), there is also unconscious bias which acts unpredictably and cannot be corrected.

The usual method is to mentally number all the items, then choose items indicated by a page of random numbers. Alternatively if items are in random order (a big assumption) a random sample can be taken without a table of random numbers by systematically taking every rth item, where r is the total number of items divided by the number to be sampled, starting at a random point amongst the first items.

If a statistician can be consulted before designing a sample, a lot of pitfalls can be avoided.

CHART OF ACCOUNTS

FOR LARGE SCALE PRIVATE ENTERPRISE TEXTILE MILL WITH COSTS CLASSIFIED BOTH BY NATURE AND COST CENTRE

4	A A	A PERMIA	W	TRITTE	MINIO	TENT
	• ^	10 B 6			- B I	
	770 NOVE 1		(C) (C) (F)		41 3 1 1 0	

10	~		1
10	(21	pita	ı.
10	Ca	pila	L

- 100 Ordinary shares
- 101 Preference shares
- 12 Obligatory reserves
 - 120 Share premium account
 - 121 Capital redemption reserve fund
- 13 Free reserves
 - 130 Reserve for expansion
 - 131 Reserve for increased costs of replacement
 - 133 Tax equalisation reserve
 - 134 Contingencies reserve
 - 135 General reserve
- 14 Profit and loss account balance
 - 140 Profit and loss account balance
- 16 Long term loans
 - 160 Debentures
 - 161 Future tax liability
- 18 Reinvestment outside the firm
 - 180 Investments in subsidiary companies
 - 181 Other trade investments
 - 182 Non-trade investments quoted
 - 183 Non-trade investments unquoted
 - 184 Tax reserve certificates

2 FIXED ASSETS

- 20 Intangible fixed assets
 - 200 Goodwill
 - 201 Patents and trademarks
 - 202 Production research and development (deferred revenue expenditure)
 - 203 Marketing research and development (deferred revenue expenditure)
- 21 Fixed assets in construction
 - 210 Buildings under construction
- 22 Land
 - 220 Freehold land
 - 221 Leasehold land

Buildings, roads, etc.Buildings

24 Fixtures (leasehold property) 240 Fixtures and fittings

25 Plant and machinery

250 Plant and machinery

251 Motor vehicles

252 Office equipment

26 Furniture 260 Furniture

28 Depreciation provisions

280 Depreciation on patents and trademarks

282 Amortisation of leaseholds

283 Depreciation on buildings

284 Depreciation on fixtures

285 Depreciation on plant and machinery

286 Depreciation on furniture

3 CURRENT ASSETS - FINANCIAL

30 Cash 300 Cash in hand

31 Banks 310 Cash at bank

32 Bills receivable 320 Bills receivable

33 Debtors and prepayments

330 Trade debtors

331 Prepayments

332 Loans to officers

339 Other debits

38 Provisions

380 Provision for bad and doubtful debts

381 Provision for discounts allowable

4 CURRENT LIABILITIES

40 Suppliers

400 Trade creditors (materials)

401 Wage and salary creditors and accruals

402 Expense creditors and accruals

403 Creditors for capital assets

41 Short term loans and overdrafts

410 Bank loan

411 Bank overdraft

42 Bills payable 420 Bills payable

43	Tax	lia	bi	lity

- 430 Corporation tax
- 431 Dividend tax
- 432 Turnover tax

44 Dividend and interest creditors

- 440 Ordinary dividend
- 441 Preference dividend
- 442 Debenture interest
- 443 Other interest

5 CURRENT ASSETS - INVENTORY

- 50 Raw materials
 - 500 Raw cotton
- 51 Manufactured parts
 - 510 General maintenance parts
 - 511 Electrical maintenance parts
 - 512 Loose tools
- 52 Consumable supplies
 - 520 Petrol, oil and lubricants
 - 521 Stationery
 - 522 Canteen food and stores
- 53 Rejected work and scrap
 - 530 Rejected work for rework
 - 531 Scrap
- 55 Work in progress
 - 550 Yarn
 - 551 Cloth
- 56 Finished goods
 - 560 Yarn 1 count
 - 561 Yarn 2 count
 - 562 Yarn 5 count
 - 563 Yarn 10 count
 - 564 Yarn 16 count
 - 565 Yarn 20 count
 - 566 Cloth style no. 1
 - 567 Cloth style no. 2
- 57 Packing materials and containers
 - 570 Packing cloth
 - 571 Boxes
 - 572 Returnable containers
- 58 Provision for loss or diminution in value
 - 581 Provision for loss on parts in stock
 - 586 Provision for decline in market value of finished goods

6 COSTS (BY NATURE)

- 60 Materials
 - 600 Raw cotton
 - 601 General maintenance parts
 - 602 Electrical maintenance parts
 - 603 Loose tools
 - 604 Petrol, oil and lubricant
 - 605 Stationery
 - 606 Canteen food and stores
 - 607 Duty
- 61 Labour
 - 610 Wages (weekly paid)
 - 611 Wages overtime
 - 612 Wages holiday pay
 - 613 Bonus
 - 614 Salaries (monthly paid)
 - 615 Salaries overtime
 - 616 Salaries holiday pay
 - 617 Commission
 - 618 Employees provident fund
 - 619 Directors' fees
- 62 Building costs
 - 620 Rent
 - 621 Rates
 - 622 Water
 - 623 Electricity (lighting)
 - 624 Cleaning
 - 625 Security by outside contractors only
 - 626 Maintenance
- 63 Production costs
 - 630 Machine hire
 - 631 Outworkers and sub-contractors
 - 632 Royalty
 - 633 Machine maintenance contracts
 - 634 Steam
 - 635 Electricity (power)
 - 636 Compressed air
 - 637 Consultancy fees
- 64 Office costs
 - 640 Printing
 - 641 Postage
 - 642 Telephone and telegrams
 - 643 Newspapers and periodicals
 - 644 Subscriptions
 - 645 Donations
 - 646 Advertising
 - 647 Meetings and excursions
 - 648 Audit fees
 - 649 Legal fees

- 65 Transportation and travel
 - 650 Vehicle licences
 - 651 Vehicle hire
 - 652 Freight and carriage inwards
 - 653 Freight and carriage outwards
 - 654 Landing charges
- 66 Insurance
 - 660 Fire
 - 661 Loss of profits
 - 662 Burglary
 - 663 Cash and goods in transit
 - 664 Motor
 - 665 Accident
 - 666 Workmen's compensation
 - 667 Public liability
 - 668 Fidelity guarantee
- 67 Depreciation
 - 670 Depreciation on patents and trademarks
 - 672 Amortisation of leaseholds
 - 673 Depreciation on buildings
 - 674 Depreciation on fixtures
 - 675 Depreciation on plant and machinery
 - 676 Depreciation on furniture
- 68 Dividends, interest, etc. and tax
 - 680 Ordinary dividend
 - 681 Preference dividend
 - 682 Debenture interest
 - 683 Other interest
 - 685 Income tax
 - 686 Dividend tax
 - 687 Turnover tax
 - 688 Expenditure from prior years
- 69 Charged to cost centres
 - 690 Materials
 - 691 Labour
 - 692 Building costs
 - 693 Production costs
 - 694 Office costs
 - 695 Transportation and travel
 - 696 Insurance
 - 697 Depreciation

7 COSTS (BY COST CENTRE)

- 70 Research and development
 - 700 Design department

71 Production

710 Spinning shop

711 Weaving shop

712 Dyeing and bleaching shop

72 Sales and distribution

720 Sales department

721 Finished cloth store

722 Despatch section

73 Administration

730 General management

731 Secretarial and legal

732 Cashier

733 Financial accounting

734 Budgets and cost accounting

735 Internal audit

74 Building services

740 Buildings maintenance department

741 Security

75 Equipment services

750 Mechanical maintenance department

751 Electrical maintenance department

76 Material services

760 Purchasing officer

761 Receiving inspection

762 Raw materials store

763 Maintenance spares store

764 Transport section

77 Personnel services

771 Personnel department

772 Training department

773 Canteen

774 Medical

78 Production services

780 Steam

781 Water

782 Production control section

783 Work study section

79 Re-apportionments (credit balances)

790 Research and development

791 Production

792 Sales and distribution

793 Administration

794 Building services

795 Equipment services

796 Material services797 Personnel services

798 Production services

8 REVENUE

- 80 Sales revenue
 - 800 Sales of yarn 1 count
 - 801 Sales of yarn 2 count
 - 802 Sales of yarn 5 count
 - Sales of yarn 10 count 803
 - Sales of yarn 16 count 804
 - Sales of yarn 20 count 805
 - 806 Sales of cloth style no. 1
 - 807 Sales of cloth style no. 2
- 81 Cost of sales
 - 810 Cost of sales of yarn 1 count
 - 811 Cost of sales of yarn 2 count
 - Cost of sales of yarn 5 count 812
 - 813 Cost of sales of yarn 10 count
 - Cost of sales of yarn 16 count 814
 - 815
 - Cost of sales of yarn 20 count Cost of sales of cloth style no. 1 816
 - 817 Cost of sales of cloth style no. 2
- 82 Other income
 - 820 Income on trade investments
 - 821 Income on other investments
 - 822 Profit or loss on disposal of assets
 - 823 Profit or loss on sale of scrap
 - 824 Discounts received
 - 825 Transfer fees
 - 828 Revenue from prior years

NOTES

- Code 1 includes not only capital, debentures, etc. invested in the firm, but also reinvestment outside the firm. The net total represents net investment in the firm and is significant for a comparison with operating profit.
- Deferred revenue expenditure is included with other intangible 2. fixed assets.
- 3. Financial assets are assets fixed in money terms such as cash, debtors and bills receivable. It is important to distinguish these from physical assets such as fixed assets and inventory, as the latter gain from inflation, while financial assets decline in value.
- 4. Code 58 is kept for provisions on inventory just as 28 is kept for depreciation on fixed assets.
- 5. Code 6 includes all costs charged in the period on the normal accrual basis, classified according to the type or nature of expense.
 - Code 7 includes exactly the same costs in total, but is broken down by cost centre. The flow of costs is charted below. Note that codes 60-67 are all debit accounts which accumulate costs throughout the year. Code 69 is credited so that the same costs can be

re-classified by cost centre and debited to codes 70–78. Code 6 as a whole is self-balancing except for dividends etc. on Code 68 which are not charged to Cost Centres.

6. Codes 70–78 also accumulate costs throughout the year. These can be re-apportioned amongst themselves as required. For instance, expenses may be charged directly to cost centres wherever possible, then code 79 may be credited and codes 70–73 debited with the service costs 74–78. Then 79 may be credited and production (71) debited with R & D (70) and administration (73).

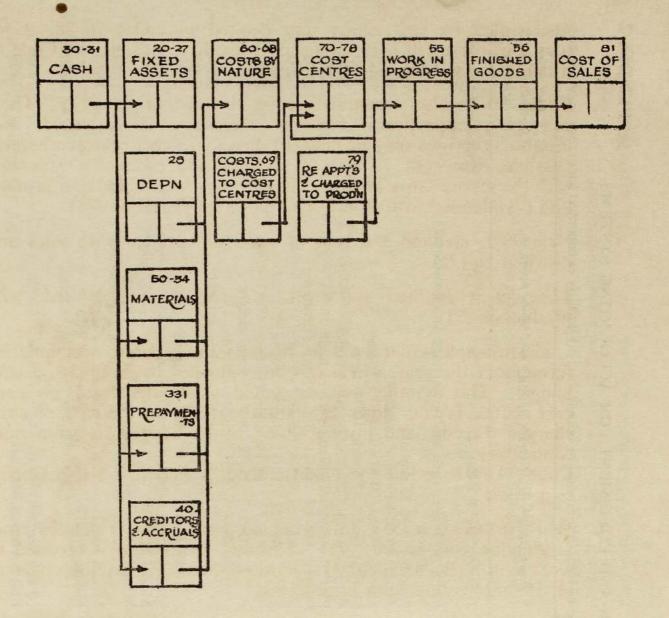
Next 79 is credited and cost of sales (81) debited with sales and distribution (72).

Then 79 is credited and work in progress (55) debited with production (71).

The principle is that codes 70–78 contain only debits, accumulating throughout the year, which can be controlled by comparison with budget. The monthly reports would show the total on each cost centre, broken down by natural expense in the case of costs charged directly, and distinguishing controllable costs from non-controllable costs.

Code 79 includes all the credits, making section 7 self-balancing as a whole.

- 7. Work in progress (55) is an asset account. This is debited from production cost centres (71). Finished production is credited to work in progress, and debited to finished goods (56), leaving a balance on 55 representing work in progress.
- 8. When finished goods are sold, their cost is credited to 56, leaving a balance representing finished goods in hand, and debited to cost of sales (81).
- 9. Periodically revenue accounts (80) and cost of sales accounts (81) are cleared to Profit and Loss account (14). Other income (82), and dividends interest and tax (68) are also cleared to Profit and Loss account.



APPENDIX 2

SURVEY OF OFFICE MACHINES AND EQUIPMENT FOR ACCOUNTING SYSTEMS

This survey made in November, 1969, is as complete as the authors could make it, but no liability is accepted for errors or omissions. N.B.

List price (Including Feecs, duty, etc.)	Prices on application Rs. 1250 1250 1990 14475 1150 1250 1150 1150 1250 1250 1250 125	6800 795 1105 1050	1900
Brief Details of Model, Capacity and Main Features	J. Series, and P – Series 100 S Add-lister with shuttle carriage and crossfooter 10 key Model 150 12/13 digits Model 15 10 key hand-operated Summa Prima 20 Manual 10/11 digits Summa Quanta Electric 10/11 digits Elettro Summa 20 Electric 12/13 digits Elettro Summa 23 Electric 12/13 digits Model AH-11 10/11 digits, hand operated AE-8 7/8 digits, electric AE-11 10/11 digits, electric AE-13 12/13 digits electric 132.090 11/12 digits – hand/electric 132.860 11/12 digits – electric 13" shuttle carriage 1 total	132.864 – do – 2 totals Model 509 Keydrive adder half-keyboard 9 digits Model 512 – do – Model 108–10 Adding-listing Machine 10 key Model 160–12 – do – Model 160–12 – do – Model 162–12 – do – Hand operated	10 key Electric Full keyboard Manual
Manufacturer/Local Agent	Burroughs/Office Appliances Ltd. Kienzle/Office Systems and Machines. Monroe/Browns NCR/NCR Olivetti/Office Equipment Olympia/Office Appliances Ltd.	Plus/Hayleys Precisa/Hayleys	Remington Rand/Muller and Phipps
Item	Adding, Subtracting and Listing Machines:		

2040 4050

808 Hand operated stencil machine

Model 64 Stencil Machine

Roneo/Browns

and Accounting Book-Keeping

Machines

Machines

Analysis

880E Electric

APPENDIX 2 (Contd.)

SURVEY OF OFFICE MACHINES AND EQUIPMENT FOR ACCOUNTING SYSTEMS

This survey made in November, 1969, is as complete as the authors could make it, but no liability is accepted for errors or omissions. Including Feec, duty, etc.) List price 1350 14500 069 2490 995 5000 2500 19750 24000 - Electric plate embossing machine - do - with selector Bradma Model Windsor - Electric printing machine Brief Details of Model, Capacity and Main Features Model AM 501 Adding-listing with multiplication Bradma Model SHA - Hand printing machine Model 151 Heavy duty. Full keyboard electric - op feature 10 key electric 10 digits Model 600 Semi-automatic - Hand Addresserette, Single print - Hand Model 1600 Automatic - Electric Model 500 Single print - Hand Model 14 10 key electric Model 200 10/11 digits Bradma Model UNK Bradma Model UNK Bradma Model KEN Model AM 602 Manufacturer/Local Agent Adrema/Office Equipment Systems & Machines Tokyo Electric/Office Addressograph/NCR Underwood/Browns Elliott/Hayleys Multigraph Item Addressing Machines N.B.

30,000 to 100,000 + 12,000 to 75,000 application 10,750-78,180 Prices on National 42 Sales ledger posting & sales analysis (9 or 10 National Class 31,32 & 33 Full alpha numeric keyboard F-Series Electro mechanic From 2-28 registers Upto 300 memories National Class 2000 - 27 (registers) 3-Series Electronic National 41 Kienzle/Office Systems and Burroughs/Office Appliances Machines NCR/NCR NCR/NCR

National 160 Full numeric keyboard

categories)

XXXX

4850-9450

10270

1650

Hand operated 10 digit

Model HL-21 Rotary calculator. Busicom electronic calculators

Nippon/Office Systems and

-op-

double with square root feature

APPENDIX 2 (Contd.)

SURVEY OF OFFICE MACHINES AND EQUIPMENT FOR ACCOUNTING SYSTEMS

This survey made in November, 1969, is as complete as the authors could make it, but no liability is accepted for errors or omissions. (Including Feec. duty, etc) application List price Price on 23700 29700 20000 7500 5000 5000 6750 1950 0006 7500 10040 0000 2025 3195 8150 Ln-200 Hand operated rotary calculator Full KB. 10 digits LA7-200 Electric rotary calculator Automatic division 10 Audit 1502 2 registers, alpha keyboard, stand Audit 1513 3 registers, memory, alpha keyboard, stand Euconta 50 3 registers + memory, Typewriter keyboard CI-13 Hand operated rotary calculator 10 key 13 digits with memory 14 digit Brief Details of Model, Capacity, and Main Features constant 16 digits constant 14 digits double memory & Model 18-1 Electronic calculator single memory & Model 10 LCM Rotary calculator fully automatic Factura 3 Billing machine. Typewriter keyboard fully automatic C 16 Printing calculator, with back transfer 132.964 2/3 registers 18" shuttle carriage Decima Printing Calculator 12 digit 2 registers 3 registers + memory CAI-13 Electric -do-Electronic calculators Electronic calculator Decima 'S' -do-18-2 Audit 413 Audit 402 Manufacturer Local Agent Marchant/Muller & Phipps Olympia/Office Appliances Diehl/Office Systems and Monroe/Brown & Co. Triumph/Perera Bros. Inzadi/Perera Bros. Facit/Avra & Co. Olivetti/Office Machines Equipment NCR/NCR Item Calculators

SURVEY OF OFFICE MACHINES AND EQUIPMENT FOR ACCOUNTING SYSTEMS

This survey made in November, 1969, is as complete as the authors could make it, but no liability is accepted for errors or omissions. N.B.

Item	Manufacturer Local Agent	Brief Details of Model, Capacity and Main Features	List price (Including Feec, duty, etc)
Calculators (Contd.)	OEM/Office Systems & Machines Olivetti-Office Equipment	Commodore Printing Adder-Multiplier Electric Multisumma 20 Printing calculator (no division) 12/13	Rs 2150 2925
		Divisumma 24 Printing calculator Divisumma 14 GT —do— with grand total —do— Divisumma 26 — do— Divisumma 26 GT —do— with grand total —do— Tetractys Printing calculator with 2 registers 12/13 digits	4950 5900 5650 8500
	Olympia/Office Appliances	>	Price on application 6925 Price on application
	Precisa/Hayleys	e 12 digits tted m) 12/13 digits	1900 3400 5125
	Remington/Muller & Phipps Rand Sumlock/Hayleys	Model 99 Printing calculator 11/12 digits -do- Figureflow keydrive adding-calculating comptometer 9 digits	5250 5500 3025
		Duolectric -do- 9 digits	3355 4635 5080
Cash Registers	Gross/Office Equipment	Ambassador Ticket issuing model. Hand/electric Ambassador Bill certifying model -do-	5950

about 12000

Multilith (offset litho)-import on licence only

System/360 series

1900 series

ICL/Office Equipment Addressograph/NCR

IBM/IBM

Blockand/NCR

Anderson

Multigraph

Duplicating

Machines

Ceylon Ltd.

-op--op-

APPENDIX 2 (Contd.)

SURVEY OF OFFICE MACHINES AND EQUIPMENT FOR ACCOUNTING SYSTEMS

This survey made in November, 1969, is as complete as the authors could make it, but no liability is accepted for errors or omissions. (Including Feec, Prices on applica. duty, etc) 4000 40000 List price 4200 1750 4450 9500 Rs. tion Finted letters (types) fitted to Sinhalese and English RC 7. Ticket issuing & bill certifying Electric 10 key Brief Details of Model, Capacity and Main Features L-Series medium size computers, cardor tape input 172-06/73 Electric 2 registers 10/11 digits typewriters for cheque writing Wide range AH-ILK Hand 10/11 digits Burroughs/Office Appliances Manufacturer Local Agent Olympia/Office Appliances nzadi/Perera Bros. Halda/Perera Bros. NCR/NCR Cash Registers Cheque writers (contd.) Item Computers N.B.

850 1600 5000 3050 6275 Stencil duplicators with cabinet Foolscap size spirit duplicators, hand-operated automatic feed D 12 Spirit duplicator, hand feed D 20 -do- automatic Model 105, hand-operated Model 300, hand-operated auto-ES 390 electronic stencil cutter Model 360 -do - and auto-Model 320, hand & electric, Banda 1700 HE double clip matic inking etc. automatic feed 1700 HE Banda Portable matic feed Banda 10 D Banda Gestetner/Gestetner of

Ormig/Hayleys

Digitized by Noolaham Foundation noolaham.org | aavanaham.org

Steel cupboards for shelf or lateral filing

APPENDIX 2 (Contd.)

SURVEY OF OFFICE MACHINES AND EQUIPMENT FOR ACCOUNTING SYSTEMS

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Item	Manufacturer/Local Agent	Brief Details of Model, Capacity and Main Features	List price (Including Feec, duty, etc)
			Rs.
Duplicating Machines (Contd.)	Re. Rotary/Office Equipment	Model R.R. M4, HAU, -do- Model R.R. M3, EAU, Foolscap size	1410 2025 2550
		automatic Model R.R. 1000 hand &	5250
		electric Fully automatic Model R.R. 2000 electronic	
	Shourie/Off. Systems and	plicator	2450
Filing equipment-	Machines Alpha/D.K. Mody	1	4650
cabinets	Ceylon Latex Products	Vertical filing cabinet - 4 drawer Vertical filing cabinet - 4 drawer	460
	Chubb/NCK	Lateral filing cabinets (import on licence only)	application
	Metal Pressing/Off. Equipment	Vertical filing cabinets – 2 drawer – 3 drawer	425
	Metco/Havlevs	Vertical filing cabinet - 4 drawer	525
	Office Systems & Machines		Rs. 75 per drawer
		8" X 5"	95 -do-
			345
		3 drawer 4 drawer	450

APPENDIX 2 (Contd.)

SURVEY OF OFFICE MACHINES AND EQUIPMENT FOR ACCOUNTING SYSTEMS

N.B. This survey mad	e in November, 1969, is as compl	N.B. This survey made in November, 1969, is as complete as the authors could make it, but no liability is accepted for errors or omissions.	d for errors or omissions.
Item	Manufacturer Local Agent	Brief Details of Model, Capacity and Main Features	List price (Including Feec, duty, etc.)
Filing equipment-box filesloose leaf files and binders	Leitz/D.K. Mody Kalamazoo/Kalamazoo	Thong binders-various sizes and covers	Rs. 15 40-444
visible record equipment	Brownbuilt/Hayleys Chubb/NCR Godrej/D.K. Mody Kalamazoo/Kalamazoo	Card cabinets, various sizes, e.g. 16 drawer 8" x 5" Various Visadex card cabinet, brass cardholders Visible strip indexes, wall & rotary	Prices on application 1250 Prices on application
Pegboards	Kalamazoo/Kalamazoo	Copywriter boards, various sizes	275–480 155–210
Punched Card Equipment (mechanised)	IBM/IBM ICL/Office Equipment	Various Various Various	Prices on application -do-
Safes Summariser Boards Time Card Recording Equipment	Chubb/NCR Kalamazoo/Kalamazoo Simplex/Office Equipment	Various 30" x 19½" Model 5000 H Time recorder Handshift mechanism Model 5000 Automatic	-do- 480 2575 3900
		Model A1/50 Autograph time recorder Spring driven model automatic	3150

GLOSSARY OF TERMS USED IN MECHANISED ACCOUNTING AND COMPUTERS

(Reference (BS) attached to certain definitions is to the British Standards Institution Glossary of Terms used in Automation Data Processing Standard No. 3527: 1962)

A

access: the ability to obtain information from storage or place information into storage.

access time: time required to locate and obtain information stored within the processor or its backing store; the sum of waiting time and transfer time.

immediate access: where the waiting time taken to approach a storage area is effectively zero, and usually the data transfer rate is relatively fast.

random access (direct access): where the time taken to approach a storage area does not depend on the location of the information most recently obtained from or placed into storage.

serial access: where the waiting time depends upon the location of the information in storage.

accumulator: a register in which totals can be formed.

address: the characters which identify a register or a specific location, word or area of storage.

- algorithm: a rule for the solution of a problem in a finite number of steps; e.g. a full statement of an arithmetical procedure for evaluating sin X to a stated precision. (BS)
- alphanumeric: the full character set of a machine which processes alphabetic and numeric data.
- analogue: the representation of numerical quantities by means of physical variables such as rotation, voltage or resistance. Analogue computers are used for scientific work; business data processing uses only digital computers.
- area, input or output: a block of storage reserved for data being transferred from and to the input and output units.
- arithmetic unit: a section of a computer where arithmetical, logical or shift operations are performed. (BS)
- assembler: a computer program which operates on symbolic input data to produce instructions in machine language. An assembler generally translates symbolic operation codes with the result that the same number of instructions are obtained in machine code as were written in symbolic form (see also compiler).

assembly system: the symbolic language used in conjunction with a particular assembler.

audit sheet: same as proof sheet.

audit strip: on adding machines and cash registers, the audit strip is a record of every entry made through the machine (similar to the proof sheet is an accounting machine).

autocode: see program.

automatic data processing (ADP): the manipulation of data according to a pre-determined set of instructions. Usually by means of an electronic computer.

automatic programming: see program.

automation: intensive mechanization comprising the co-ordinated automatic control of machine systems, and the automatic transport, testing and treatment of materials and products throughout a sequence of operations. The term also includes automatic data processing when this is employed to monitor and regulate a group of linked activities. (BS)

B

base: synonymous with radix.

binary: of two;

binary coded decimal (BCD): a system of binary codes in which each digit of a decimal number is separately translated into the binary equivalent.

binary digit (bit): a digit (0 or 1) of a scale-of-two number; the smallest unit of information.

binary notation: the writing of numbers in the scale of two e.g.

Binary Notation		De	cimal Notation
000001	=	1	
000010	=	2	
000011	==	3	i.e. $1+2$
000100	=	4	
000101		5	i.e. 1 + 4
001111	==	15	i.e. $1+2+4+8$
111111	=	63	i.e. $1+2+4+8+16+32$

Binary notation is used in commercial computers as each digit position can be cheaply and reliably represented by a 2-state electrical component e.g. a core magnetised in one direction means it is a 1; magnetised in the other direction makes it 0.

bit: see binary digit

block: (1) a unit of information of convenient size for processing;

- (2) the area of storage in which a block of information is recorded;
- (3) a unit of computer construction (building block);

inter-block gap: blank storage locations or time interval required between blocks to suit the logical design of a system.

- block diagram: a conventional drawing of a system, instrument, computer or program in which all portions are represented by annotated boxes. See also Flow diagram. (BS)
- blocking: the combining of two or more records into one block for processing.

branch: see jump.

- buffer: a hardware device for matching the speed and/or code of information handling between a peripheral machine and the central processor.
- byte: a set of characters; in the IBM System/360 a byte consists of 8 bits plus a parity bit, which can hold one alphanumeric character, or two 4-bit decimal digits (see also word).

C

- capacity: (1) Of a communication channel. The hypothetical ultimate limiting rate, with any conceivable form of encoding, at which data could be communicated by a given channel with the frequency of errors acceptably close to zero. This will depend on various physical properties of the channel (e.g. the noise and its statistical properties, bandwidths, signal power). (BS)
 - (2) Of a store. The number of digits or words that can be stored. (BS)
- card punch: a machine which punches patterns of holes in cards to store information for subsequent processing; the punching may be performed serially (column by column) or in parallel (row by row), or the cards may be block-punched.
- channel: (1) a recording band on a magnetic drum or similar rotational store; (2) a path or aggregate of related paths for carrying signals between a source and a destination.
 - Note:— In data transfer in which the elements of each digit are sent in parallel a channel comprises several parallel paths.
- character: one of the set of symbols which can be used by a particular data processing system, such as the numerals 0 to 11, letters A to Z, and additional symbols.
- character recognition: the machine-reading of characters which are designed to be easily read by human beings; the characters may be in magnetisable ink and read by magnetic ink character recognition (M.I.C.R.) equipment, or in normal printing and read by optical character recognition (O.C.R.) equipment.
- check digit: a digit based on the digits of a number which is checked by the computer to ensure that the number has been correctly recorded. There are various check digit systems. In the modulus 11 system, the check digit is determined by multiplying each digit by weights, adding the products dividing by 11 and subtracting the remainder from 11, e.g.

Account number Weights	4 7	5 6	7 5	8 4	4 3	2 2
Products	28	30	35	32	12	4
Sum of products Divide by 11 11 – 9		141 12 ·		9 rei	maino	ler.

Therefore the account number should be recorded as 457842/2. If the number were misrecorded the computer would arrive at a different check digit and signal an error.

clear: to erase the contents of a storage area; in the case of equipment capable of distinguishing between zero and blank, the preferred terms are zeroise and erase.

clear symbol: a symbol printed by a machine to indicate that the register is clear.

collate: in punch card operations. To merge. (BS)

collator: (or interpolator) a machine which feeds and compares two packs of punched cards in order to match or to merge them or to check their sequence. The cards which match can be separated from those that do not match, thereby making it possible to select as well as to file cards automatically. (BS)

compiler: a more sophisticated assembler which inserts subroutines and thus produces more instructions than are contained in the written source program.

complement: the number that completes or fills the capacity of a register.

computer: any device capable of automatically accepting data, applying a sequence of processes to the data, and supplying the results of these processes.

Note:— The term computer is widely used as a synonym for stored program computer, and in this sense is contrasted with calculator. (BS)

control bar: device used in an accounting machine to provide automatic tabulation, and automatic machine functions at each tabulation stop, such as adding, subtracting, printing, platen spacing, carriage return, etc. Also called form bar, tabulation bar, program bar, etc.

control unit: that portion of an automatic data processing equipment which directs the sequence and timing of operations, interprets the coded instructions, and stimulates the proper circuits to execute the instructions.

Note: An a.d.p. equipment may have more than one control unit, possibly subordinated to a central control unit. (BS)

core store: see I.A.S.

crossfooter: a register or total in an accounting machine or punch card tabulator which can subtract as well as add a number of columns horizontally.

cycle time: (1) the duration of a complete logical process in respect of a single storage location; (2) the duration of any complete sequence of operations.

cypher proof: a method of pick up proof in which a zero is printed if

no error has been made.

D

data: all or any selection of the operands and results involved in any operation, or set of operations. (BS)

Note: - Data conveys information.

data processing: the manipulation of data into desired forms.

daybook sheet: see proof sheet.

debug: to locate and correct any errors in a computer program.

diagnostic routine: a routine designed to locate either a fault in the equipment or an error in programming. (BS)

digital: pertaining to the representation of data in numerical form.

direct access: see access.

disc file: a direct-access storage device where data are recorded on a number of circular tracks on magnetic discs; the required disc and track are selected by electromechanical and electronic controls, then information is read sequentially.

dividend: the number that is to be divided.

diviser: the number by which the dividend is divided.

down-time: intervals when the computer is malfunctioning, as opposed to good time, idle time or scheduled maintenance.

drum: a magnetic storage unit in the form of a cylinder which revolves at high speed past multiple read/write heads.

dump: to transfer data from working storage to a more permanent area or medium e.g. to safeguard historical records.

duodecimal: in twelves.

duplex: a channel providing simultaneous transmission in two directions at a time, i.e. the direction is switchable.

duplex machine: one having two registers.

E

edit: to rearrange data and, for example, to select pertinent data, insert symbols and constants, suppress unwanted zeros and apply predetermined format rules.

electronic: related to that branch of science which deals with the motion, emission and behaviour of currents of free electrons (and, by extension, of certain ions), especially in vacuum tubes or photo-tubes and in semiconductors and superconductors. (BS)

Electronic equipment records data by means of electrical impulses, magnetised spots, etc. instead of mechanically by gears, cams, etc.

Note:— Electronic is often contrasted with electrical, but this distinction is simply a matter of usage, and precise rules cannot be laid down. Equipment would not normally be described as electronic unless it depended essentially for its operation on the use of one or more of: thermionic valves, gas tubes, photo-tubes, cathode-ray tubes or such solid-state equivalents as crystal diodes, transistors, etc.

- electronic data processing (EDP): data processing by means of an electronic computer.
- encode: to apply a code usually before machine processing or data transmission.
- erase: to replace the contents of a storage area by binary zero, (see also zeroise).
- executive program: a subroutine program which takes care of house-keeping and allocates priorities, particularly in conjunction with multiprogramming.

F

- field: of a punched card. A group of card columns (or parts of columns) whose punchings represent an item. For example, a field having three columns, each capable of representing one decimal digit can have punchings which are representative of numbers from 0 to 999 inclusive. (BS)
- file: an organised collection of information, e.g. a series of records stored in key-number order.
- flat platen: a writing surface or platen on which forms are laid flat.
- floating-point arithmetic: a method of calculation which automatically accounts for the location of the radix point.
- flowdiagram (flowchart): a diagram showing the main steps in a program or system and their sequence.
- format: (1) the layout of a printed document e.g. with regard to the predetermined printing area, line spacing and punctuation; (2) any other predetermined arrangement of data e.g. instruction format, file format.

form bar: see control bar.

front feed carriage: a carriage permitting insertion of documents from the front as well as from the back of the platen. The form inserted in the rear feed is usually retained and automatically line-spaced in the carriage whilst a succession of other documents are front fed and posted.

full keyboard: one having a key for every value of each digit.

G

Gang punch: a machine having a single card track with a punching station followed by a reading station. It is used to copy punching from the first card of a pack into all the succeeding cards; as each card passes the reading station it is used to control punching into the succeeding card, which is at that time passing the punching station.

Note:— 1. Means are sometimes provided to inhibit all punching into any card carrying a specified designation punching. With this facility, the punching on any designated card is copied into all cards of the pack up to but not including the next designated card. Note:— 2. Some gang punches can also be used as summary punches. (BS)

H

hardware: the physical units from which a computer is built (see also software).

hash total: a control comprised of the sum of numbers in a particular field or record area of a file, where the sum has no real significance e.g. a total of clock numbers.

heuristic: an adjective used to describe an exploratory method of tackling a problem, in which the solution is discovered by evaluations of the progress made towards the final result, e.g. guided trial and error. (BS)

housekeeping: the organisation activities necessary to maintain control of a process e.g. the recording of locations used by different parts of a program to ensure that data is not overwritten unless it is no longer required.

I

I.A.S. (Immediate Access Store): the program and data storage areas where waiting time is negligible in comparison with other operation times (I.A.S. is usually magnetic core storage) (see also access).

indicator: (1) a visual signal to the operator e.g. a panel light;
(2) a two-state device which may be set or unset by program, or automatically, or by switch setting, and can be tested by program.

information: a collection of facts or ideas.

instruction: the group of characters which defines an operation to be performed by the computer, usually including one or more addresses where data are to be found and/or placed.

instruction code: the set of instructions relative to a particular computer.

instruction format: the arrangement of operation codes and addresses within an instruction.

integer: a whole number (no fractions or decimals).

- integrated data processing: (1) carrying out a number of processing jobs from a single set of source data (2) the use of a common medium for all data processing, such as punched paper tape.
- interpreter: in punched card systems. A machine for printing on a punched card data punched in that card (interpreter) or in another card (transfer interpreter). (BS)
- interface: the junction between two devices, i.e. the central processor and a peripheral device, which exchange information in a controlled manner. Thus a standard interface facilitates the linking (by data channels and control channels) of several peripherals to a central processor.
- interrogating typewriter: an on-line computer peripheral which can be used by the operator to insert data and instructions into storage so that the program will cause an appropriate message to be typed out.
- invalid instruction: an instruction which specifies an address outside the range available on the computer, or for any other reason contravenes the logical rules of the machine.

J

- jump: to transfer control of the computer to an instruction which is not the next in sequence; the jump may be unconditional (e.g. to enter a subroutine) or conditional upon the result of a test, and conditional jumps appear on flow charts as the branching of a flow-line from a decision point.
- justify: (1) To adjust the position of words on a printed page so that the left or the right-hand margin is regular. (2) By extension, to shift an item in a register so that the most or the least significant digit is at the corresponding end of the register. (BS)

K

key: (1) a group of characters such as an item code, which is used to identify a record; (2) a parameter required by a subroutine.

key punch: a card punch controlled by keyboard operation.

I

- least significant digit: the right-hand end digit of a number or computer word, often referred to by the initials L.S.D.
- line spacing: a machine feature which automatically moves forms for recording on the correct line.
- line printer: an output peripheral which prints data a line at a time.
- logic design: the specification, derived from the logic, of the working relations between the parts of the system, without primary regard for the equipment that could be used. (BS)

loop: (1) a series of instructions which is repeated until a terminal condition is reached, often coupled with the technique of modification; (2) a condition which may be encountered when testing a new program, whereby the same non-productive sequence of instructions is repeated indefinitely.

M

machine proof: a proof of the accuracy of old balances brought forward by mechanical accumulation, or mechanical comparison of a second pick-up of the old balance with the first, as distinct from a check which is independent of or subsequent to the actual posting run.

macro-instruction: a powerful instruction which is executed as a series of simple instructions.

magnetic ink character recognition (M.I.C.R.): see character recognition.

magnetic tape: a tape of any material coated or impregnated with a magnetisable substance upon which information can be recorded by a magnetic flux;

magnetic tape deck: the mechanism used for feeding magnetic tape, with the reading and writing heads and circuitry relative to one such assembly (also known as the tape unit, tape drive or tape transport).

magnetic tape group: a number of magnetic tape decks mounted in one physical unit.

magnetic tape systems: an unspecified number of magnetic tape decks, of a particular speed-range or size, e.g. 1900 \(\frac{1}{2}\) inch (96 kc/s) magnetic tape system.

manifold: two or more copies produced at one time, usually by carbon paper.

mark reading: the sensing by photoelectric or other means of simple code-marks printed or written on cards or other stationery (see also character recognition);

mark scanning: the optical reading of marks.

mark sensing: the reading of electrically conductive marks by sensing brushes.

medium: a means of carrying data e.g. copy sales invoices may be the medium for posting sales data to the sales ledger (plural media); see also unit media.

memory: (U.S.A.) synonym for immediate access storage (I.A.S.).

merge: to form a single sequenced collection of items by combining two or more similarly sequenced collections. (BS)

microsecond: one millionth of a second (10 6 seconds), abbreviated/us.

millisecond: one thousandth of a second (10-3 seconds), abbreviated ms.

- modification: the technique of altering the stored value of an instruction, usually so as to operate on a different address; the value added to an instruction to modify it is the *modifier* and this may be a constant or a key; if the instruction has to be reset to its original value at the end of a routine, one method is to *modify* it by substracting a demodifier.
- module: (1) an interchangeable unit of construction, (2) an additional unit offered for sale with a computer, such as extra storage, usually corresponding to a constructional unit.

monitor: to supervise.

monitor routine: see executive program.

- monitor typewriter: an on-line print unit by which exceptional circumstances are brought to the notice of the operator (see also interrogating typewriter).
- most significant digit: the left-hand end digit of a number or computer word, often referred to by the initials M.S.D.
- motor bar: a bar provided on electrically operated machines which causes the machine to operate when touched.
- motorised keys: keys which operate an electric machine directly without additional use of a motor bar.
- multiplicand: a number that is to be multiplied by another number (the multiplier).
- multiplier: the number by which another number (the multiplicand) is multiplied.
- multiprogramming: a technique by which the central processor can proceed with several routines or programs overlapped in time, usually in conjunction with a software system called the *executive* program (q.v.) see also simultaneity.

N

- nanosecond: one thousandth of a millionth of a second 10-9 second abbreviated ns.
- non-add key: control key on an accounting machine which prevents a number (e.g. part number, account number) being added into the machine registers.

O

- off-line: pertaining to those data processing machines or operations which are part of the system but are not controlled by the central processor.
- offsetting: placing ledger cards, etc. in a tray slightly to one side e.g. to indicate to the machine operator which cards are to be posted.
- on-line: pertaining to peripheral equipment of the computer, attached to and controlled by the central processor.

operation: (1) A defined action.

(2) The derivation of an item or items, called the result, from one or more given items, called operands, according to defined rules which specify the result for any permissible combination of values of the operands.

Note: The term operands is sometimes used collectively for both operands and results, since the results will often be operands in subsequent operations. (BS)

optical character recognition (O.C.R.): see character recognition.

order code: synonymous with instruction code.

overflow: the condition arising from an arithmetic operation where the result is greater than the capacity of the register or storage area in which it is formed; the term *overspill* should not be used.

P

- pack: (1) to store several small items in the area normally provided for one word or record, (2) a collection of punched cards bearing data for a particular run (also deck).
- packing density: the amount of information that can be recorded in a given space, particularly a density in digits to the inch on magnetic tape.
- paper tape (punched tape, perforated tape): a tape of known dimensions in which data may be recorded by means of a pattern of holes, usually from 11/16" to 1" wide.
- parallel: dealing with the elements of a message concurrently, each at its own site. (BS)
- parameter: (1) a value which must be supplied to a subroutine by the main program to ensure that a process is performed in the required manner; (2) a value which is constant for the time being.
- parity bit: a check bit which is appended to a character, word or block when necessary to ensure that the total number of bits in the series to be checked is odd or even, according to the logic of the system.

pass: a single performance of a specific loop or program; sometimes used as synonym for run.

peripheral: any input, output or storage unit.

pick-up: the bringing forward of an old balance.

pick-up proof: a method of proving the accuracy of pick-ups.

platen: the roller around which forms are held in a machine.

posting: the operation of selecting an account, picking up an old balance, entering a debit or a credit, and producing a new balance. To this may be added the entry of date, reference number and any other details, and the proving of entries.

pre-list: a list of amounts extracted from posting media taken before a posting operation for subsequent comparison with the total of the postings made.

product: the result of a multiplication.

program: (1) the complete sequence of instructions for a job to be performed on the computer; (2) to devise a procedure and list the steps necessary for a job to be performed on the computer;

automatic programming or autocode: a system which provides for the translation by computer of programs written in symbolic form into machine language (see also assembler, compiler).

object program: the program produced by automatic translation of a source program;

source program: a program written in a symbolic language designed for the easy expression of problem-solving procedures; the source program is input to an assembler or compiler and the output is an object program in machine language.

program bar: see control bar.

proof: verification of accuracy. See pick-up proof and proof sheet.

proof sheet: the continuous summary of entries held in the machine during a run. A posting summary, journal sheet or day book.

pulling: a method of posting in which a clerk takes active accounts from the files and interleaves them with the relevant posting media so that the machine operator can then concentrate on machine posting (see also stuffing).

punched cards: a card used for recording alphabetic or numeric data for input to a computer or for use with punched card sorting and tabulating equipment. Punched cards are unit media (qv).

punched paper tape: paper tape up to 1 inch wide and 1200 feet in length containing 5, 7 or 8 punching positions across the tape for recording alphabetic or numeric data for input to a computer.

Q

quotient: the result of a division.

R

radix: the number of characters for use in each of the digital positions of a numbering system, e.g. decimal notation is radix 10.

random access store: a store designed to reduce the effect of variation of access time for an arbitrary sequence of addresses. (BS)

raw data: data in its original form as collected for processing.

read: to extract or copy data from a record or signal. (BS)

reading: reading a total is the operation of printing the amount accumulated in a register without clearing the register. Also called subtotalling.

- real time processing: the processing of data for immediate use in controlling the data source, as opposed to batch processing.
- record: (1) a group or block of related data treated as a unit;

(2) to place data in storage.

- register: a hardware device comprising storage elements with special significance in the logical design of a computer or accounting machine, or punched card tabulator. Also called accumulator (qv) counter, or adding box.
- reproducer: a machine with two separate card tracks; one, called the reading track, embodies a reading station; the other, called the punching track embodies a punching station. In its simplest use the card produced at the punching station is a copy of the card read. In the process data can be omitted from, or transferred in position on, the reproduced card.

Note - 1. Machines in current use can often punch data not present

in the original card by means of special devices embodied.

Note -2. Machines in current use usually embody two further reading stations, one on each card track to allow the reproduced punchings to be compared with the original.

Note -3. Sometimes the punching track of a reproducer is used as a gang punch by controlling its punching station from its reading

station. (BS)

round: deletion of one or more of the least significant digits of a number or value, after addition of a factor to bias the result, e.g. to the higher cent (see also *truncate*).

routine: any part of a program which deals with a particular aspect of the overall procedure (see also subroutine).

run: (1) the performance of a complete data processing job by a computer program through to its run-out condition;

(2) any complete automatic sequence.

S

search: to examine a series of items for any that have a desired property or properties.

seek: to look for data relative to a given key.

serial: dealing with the elements of a message one after another in the same device. (BS)

shift: to move the characters in a storage area to the left or right; in the case of a number with all digits in the same radix a left shift is equivalent to multiplying, and a right shift to dividing, by a power of that radix.

sign: an arithmetic symbol which distinguishes positive and negative quantities;

sign bit: an information bit whose function is to indicate the algebraic

sign of a quantity.

- simulate: to imitate by a model or computer routine the performance of a mechanical or human system.
- simulator: (1) a working model, an analogue computer or digital computer routine that can be used to predict the performance of the original process or system; (2) a program based on a mathematical model; (3) a routine designed to make one computer behave like another.
- simultaneity: the simultaneous operation of one or more peripheral devices and the central processor under the control of the same program (see also multiprogramming).
- software: the library services available to users of a particular computer, e.g. subroutines, assemblers, compilers and other programming aids (see also hardware).
- solid logic technology: miniaturised modules which result in faster circuitry because of less distance for current to travel, lower material cost because of automated production, and easier maintenance because of improved access to circuit elements.
- sort: to segregate items into groups according to the keys used to identify them. Pigeon-holes, pockets or locations are assigned in advance, and used to collect items having like keys.
 - Note Sorting does not in itself involve sequencing, for the 'pigeon holes' may have any arrangement whatsoever. (BS)
- sorter: a machine which arranges punched cards in sequental order prior to their tabulation or filing.
- storage: the retention of data for subsequent reference.
- split platen: a platen with a locking device; when unlocked, the platen can be split into two parts (not necessarily of equal length) enabling forms on either side of the split to be vertically spaced independently of each other.
- store: a mechanical, electrical or electronic unit in which data can be recorded held and later recovered in its original form.

 external store: a store not permanently linked to a computer but holding data in a form acceptable to it, e.g. a magnetic tape store.

 Note External store and internal store are terms which take on a precise meaning only with reference to a given installation. (BS) internal store: a store built into a computer and directly controlled by it. (See note to External store). (BS) immediate access store: see I.A.S.
- stuffing: a method of posting in which a clerk interleaves the posting media with the relevant accounts before the machine operator starts the machine run (see also pulling).
- subprogram: a part of a larger program which may be executed independently during interruptions to the main program (see also multiprogramming).

- subroutine: a routine which is arranged so that control can be passed between it and a master routine, to avoid having to store similar sequences of instructions or to permit the inclusion in one program of a routine proved in another.
- summary punch: a card punch which is directly connected to and controlled by a tabulator, and which punches certain data processed by the tabulator. So called because originally such a machine punched a summary of part of a tabulation for carry forward purposes. (BS)

summary sheet: same as proof sheet.

supervisory program: (U.S.A.) synonymous with executive program.

T

tabulation: carriage movement horizontally from column to column. tabulation bar: see control bar.

tabulator: a machine which reads data punched into cards, processes it, and prints out the result.

tally roll: same as audit strip.

ten-key keyboard: one having only keys for 0-9; amounts are entered by depressing keys in left-to-right digit sequence. Also called small keyboard, or simplified keyboard.

time-sharing: synonymous with simultaneity.

- total key: a control key for clearing a register and printing a total. See also reading (sub-totalling).
- track: the path along which information is recorded on a continuous or rotational storage medium, such as magnetic tape or a magnetic drum.
- transfer time: of a store. The time interval between the instant the transfer of data to or from the store commences and the instant it is completed. (BS)
- translate: to change information from one form of representation to another without significantly affecting the meaning.
- truncate: to drop digits off the least significant end of a number without rounding e.g. the number 4.12586 could be truncated to 4.125 or rounded to 4.126 (see also round).

U

- unit media: posting media in which each voucher carries the information for one account only, so that vouchers can be physically sorted by account before posting (see medium).
- unpack: to extract several small items from one computer word or record and store them in separate locations.
- update: to revise a master file in respect of current information or transactions.
- utility routine: a routine available for repetitive data-handling procedure such as sorting or dumping data from storage.

V

validity checking: examination of data for correctness against certain parameters such as upper and lower limits, or the maximum number of items per account.

verifier: a machine for checking the accuracy of a transcription of data usually by comparison with a retranscription. (BS)

W

waiting time: of a store. The time interval between the instant the control unit calls for a transfer of data to or from the store and the instant the transfer commences. (BS)

word: an ordered set of characters representing a number or an instruction which is treated by the computer as a single logical unit; word lengths may be fixed or variable depending on the particular computer. A common fixed-length word has 24 binary bits. This can hold one 24-bit word, four 6-bit characters or three 8-bit bytes.

word-time: the time required to move a word past a particular point (especially when transfers are performed serially).

write: to record data e.g. on magnetic tape.

write permit ring: a device attached by the operator when writing is to take place; its absence prevents writing.

Z

- zeroise: (1) to replace the contents of a storage area by pulses representing the character zero (see also *erase*) (2) to reset a mechanical register to its zero position.
- zero suppression: the elimination of non-significant zeros to the left of a number before printing takes place.
- zone digit: the numerical key to a section of code e.g. 10,11 and 0 are zone digits relating to the sections of a punched-card code comprising the letters A to I, J to R and S to Z respectively.

TYPICAL EXAMINATION QUESTIONS

- 1. (a) Discuss the advantages of using code numbers in a system of stores classification.
 - (b) How would you construct a simple stores classification code? Give a brief illustration of such a code.
 - (c) T Limited produces timber which it sells in 10 feet lengths. The size of the timber produced varies from ½ to 12" in width and from ¼ to 2" in thickness. A coding system is used, parts of which are as follows:

Softwood 5" x $1\frac{3}{4}$ " Code 11014 Hardwood $7\frac{1}{2}$ " x $1\frac{1}{4}$ " Code 21510

What codes should be used for the following materials:

Hardwood $1\frac{1}{2}$ x $\frac{5}{8}$ Softwood $4\frac{1}{2}$ x $\frac{3}{4}$?

What do the following codes represent:

11915 21512?

(d) T Limited decides to stock, as a new line, 6 feet dowelling in diameters from $\frac{1}{4}$ to $\frac{3}{4}$. Suggest a suitable coding within the system and give as an example the code for $\frac{3}{4}$ diameter dowelling.

(ICWA II: 6/67)

2. Suggest a simple method of analysing 3,000 purchase invoices per month, each with two or three items, which is not based on the use of accounting machines or computers. Adding machines, however, can be made available.

(ICWA III: 5/68)

3. You have recently been appointed chief accountant of a small but prosperous manufacturing company with an accounting staff of 22. The purchase ledger is maintained by the small keyboard accounting machine section, which has two such machines, but postings and payments are usually in arrears and there is constant friction with suppliers. The clerk in charge of the keyboard accounting machine section has asked for another keyboard accounting machine and operator and you have told him to prepare a short written report on which you can base your decision. The report reads as follows:

"Following our recent discussion, I summarise below my recommendation for the purchase of another keyboard accounting machine and the employment of an additional operator. Generally, I assure you that the methods employed in my section are based

on our experience over a period of years and ensure the greatest efficiency, accuracy and flexibility of operation.

As regards the purchase ledger work, the invoices and other documents for posting are made-up in batches of about 200, in the invoice authorising and cash sections, and are then passed directly to the machine operators so that there is no delay in handling them. The operators themselves ensure that the documents in each batch are properly authorised and they have been instructed to obtain missing signatures, direct from the appropriate section head, so as to speed the work of posting. The batches are later broken down and the invoices and other documents filed in individual suppliers files by the operators.

The monthly volumes of data for all applications are on average:

Purchase ledger 1,500 items
Sales ledger 1,500 items
Costing and nominal ledger 5,000 items

In addition there are four payrolls to be produced each month; each payroll takes one operator day. It seems reasonable to allow 20 working days per month for each operator and to hope for 250 postings per operator per day.

Despite sustained hard work by the operators and some 20 hours of overtime from each of them last month we are continually failing to meet our target dates and I ask for authority to place an equipment order and for permission to approach Personnel about the additional operator as soon as possible".

You are required:

- (a) through analysis of the data, to comment upon this report and the section leader's presentation of his case, and
- (b) to produce a check list of matters which should be investigated further.

(CMI: 10/67)

4. List, with short explanatory notes, the main features of a system for controlling the flow of work through a group of 5 direct-entry book-keeping machines (other-wise called 'key-board accounting machines').

(CMI: 10/66)

5. You are financial controller of a manufacturing company employing about 1,500 people which has a rented punched card installation including:

a powerful electronic calculator two high speed punched card tabulators (one with summary punch) a collator two punched card sorters

a punched card interpreter

Almost all of the work of the punched card installation is for the accounts department and little work has been done for any of the other departments in the business.

Following a comprehensive survey, a computer department has been established, the manager of which reports to you, to develop a data processing service for :-

- (a) the accounting work already carried out on the punched card installation;
- (b) sales forecasting and other assistance to the marketing department;
- (c) programs of a non-repetitive nature for the research and development department;
- (d) stock recording leading to the introduction of a comprehensive scheme of stock control and analysis of production parts.

You wish to satisfy yourself that a proper scheme of priorities is adopted for the transfer of this work to the computer and have asked the computer manager to let you have a copy of his overall plan as the basis of discussion at a meeting between you and him, which will take place in a few days time. In the meantime you are thinking about the factors which you would wish to see considered in establishing the priorities for such a plan. You are required:—

- (a) to list these factors; and
- (b) to indicate the relative importance you attach to each.

(CMI: 10/66)

- 6. The chief accountant of M. C. Engineers Ltd. complains of delays in the provision of information about liabilities required to prepare interim and year-end accounts. Your examination reveals that:-
 - (1) There is a central buying department which is responsible for maintaining suppliers' records and information about prices; for receiving requisitions from ordering departments and placing written orders on suppliers; for "progressing" orders; and for passing invoices for payment in accordance with orders and goods received notes, after obtaining any additional authorisations necessary in connection with technical inspections.
 - (2) The company makes a great deal of expensive machinery and equipment for its own use under the direction and control of a capital projects department. This department is responsible for editing and recording requisitions for capital projects received from engineering departments, before passing them to the buying department; for "progressing" such orders in conjunction with its arrangements for "progressing" capital projects; for recording the progress and completion of any service provided by outside contractors; and for technical

- inspection and acceptance of goods and services received in connection with capital projects.
- (3) There is a goods inwards section, responsible to the buyer, where all goods delivered into the works are received centrally before being passed with appropriate goods received notes to stores or to the requisition department. Goods received notes are prepared in triplicate by the section which sends one copy to the buying department.
- (4) Invoices are received and date stamped as received by the buying department and are only passed to the accounting department after they have been approved for payment.
- (5) An analysis of invoices and supporting records reveals that external delays in rendering and internal delays in passing invoices for payment result in delays in accounting of upto two months. Internal delays in passing invoices are partly due to the number of third parties concerned with checking capital project items, and partly due to pricing discrepancies which presently have to be settled with suppliers before invoices are passed to the accounting department.

You are required to:

- (a) describe the procedures you would recommend to reduce delays, and
- (b) discuss the significance of such delays in accounting for liabilities in a well managed company distinguishing capital and revenue expenditure in relation to interim and year-end accounts.

(ICA: 5/67)

7. Outline the investigations which a company should require to be undertaken before a decision is made whether to purchase a computer for commercial work within the company.

(ACCA III:12/67)

8. You are the accountant of a medium-sized engineering factory which has employed a detailed system of management accounts for many years. A computer feasibility study has recently been completed and although this indicates that a computer could be utilized effectively, no decision has yet been made as to the size, type and make which should be employed. You feel that it would be advantageous to gain experience by using a computer service bureau before coming to a final decision.

Prepare a memorandum statement for the board of management outlining your reasons for this and also the necessary steps which would have to be taken before such a scheme could be implemented.

(ACCA III: 6/65)

9. Consider the ways in which office equipment and machines can be applied effectively in the performance of office administration. What investigations should be undertaken before office equipment and machines are installed?

(ACCA III: 6/67)

10. Discuss the means of reducing paperwork without loss of efficiency in a group of companies in the retail trade with about 100 multiple branches.

(ACCA FINAL: 12/65)

11. Name the units of equipment normally comprised in:

Either: an electronic computer installation

or: a punched card installation.

and briefly describe their functions.

(ICA INTER: 3/67)

12. The punched card equipment in the data processing department of your company consists of two tabulators with one summary punch and one reproducer, one sorter, one interpreter, and punches and verifiers.

Your company sells 100 products, but orders must be for standard quantities and there are only 278 different "standard packs" (possible combinations of product and quantity). The country is divided into nine sales areas. Discounts are not given. Goods ordered are never out of stock, and goods are never returned from customers. The data processing department, is given a daily list of finished goods received into stock.

You are required to describe (in narrative or flowchart form) a procedure for producing, from edited customers' orders and the goods received lists, with the punched card equipment available in the data processing department, the following:

- (a) Combined despatch note/invoice sets.
- (b) A weekly finished stock ledger showing, for each of the 278 different standard packs, quantity brought forward, a list of stock movements, and quantity carried forward.
- (c) A weekly sales analysis showing, for each of the nine sales areas, total sales for the week of each standard pack.

 (ICA FINAL: 11/65)
- 13. Food Company Ltd. mass produces luncheon rolls according to the following specification and standard selling price costing:-

	standard weight	standard price	cost in rupees	cost per pkt. of 12 tins Rs.
Raw materials (per mix) Cashew baby bits Ground peanuts Salt Water	16 lbs. 24 lbs. 1 lb. 30 lbs.	255/-cwt. 120/-cwt. 179/-ton	36.43 25.71 .08	
	71 lbs.		62.22	6.73
	The second secon			

	standard	rate	standard				
	minutes		cost in				
				De			
			rupees	Rs.			
Direct labour (per	pkt.)						
Mixing	10	6.25 cts.	0.62.5				
Baking	20	6.25 cts.	1.25				
Packing	9	6.25 cts.					
		0.23 Cts.	0.56.25				
	20						
	39		2.44	2.44			
	quantity	price	standard				
		per 1,000	cost in				
		F,					
Packing materials rupees							
(per mix)							
Tins							
	111	177.25	19.67				
Labels	111	112.50	12.49				
Outers	93	684.00	6.33				
	12	330	0.55				
			38.49	4.17			
			30.47	4.17			
Direct manufacturing expenses (per unit)							
Mixing) Mixing							
Mixing)							
Baking 100% on direct labour as a variable cost							
Packing Packing							
Fixed general administration, selling and works							
overheads 300% on direct labour							
overheads 300% on direct labour							
Ctondand : : c		Tota	l cost	23.10			
Standard margin for	r profit			1.90			
Standard selling price	ce per packet			25.00			
4	1 - Parage			25.00			
				·			

You are required to:

- (a) outline a system of cost accounting suitable for luncheon rolls describing the entries passing through the individual accounts in the cost ledger to cost of sales and sales accounts (a flow chart may be used if desired)
- (b) list the variances which you would expect to be reported periodically to management and add brief notes on their nature and purpose.

(ICA III: 5/67)

14. Arco Ltd. produces over 1,000 different products, each one of which is made to the customer's individual specification and order at a price agreed in advance on the basis of a cost estimate. The company's results for the year ended 31st March, 1967 have been summarised for you as follows:-

Costs directly incurred by productive cost centres:

	Rs.	Rs.
materials consumed	443,629	
direct labour (output at 'piece' rates)	107,026	
indirect labour, including salaried supervision	95,420	
expenses	31,489	
labour, materials & expenses recharged in respect of repairs by maintenance staff and	30,103	707,667
electricians	30,103	101,001
Production overheads		134,582
Selling, distrib'n & general admn. overheads		153,720
		995,969
Net Sales		1,006,160

There are three productive cost centres (rubber preparation, metal preparation and bonding) and one service cost centre (maintenance staff and electricians). Materials consumed comprise rubber and certain chemicals, which are used in rubber preparation to produce finished metal parts; all raw materials are delivered by suppliers to Goods Inwards and, subsequently, are passed into a stores from which they are issued to production. Rubber blanks and finished metal parts are stored prior to bonding where one of each is used together in the bonding operation to produce a finished product. A typical analysis of indirect labour and a typical secondary allocation of the item "expenses" being maintained by the company for each productive cost centre are as follows:

lirect labour			
Premiums			2,21
Holidays			71:
Allowances	Mark .		40
Waiting time	erien, in the	Thursday !	
Other non-productive time			4,61
General			3,900
Supervision			2,989
P.S.P.F.			1,35
P.S.P.F. Total for the year for one cost of			

Expenses		Rs.
Maintenance of plant & equipment	 • •	1,258
Printing, stationery & publications	 	131
Consumable parts		532
Grinding wheels and brushes	 • •	1
Containers	 	2
Cleaning materials	 N•80.•	47
Protective clothing	 (.• (). • ()	54
Various solvents	 	12
Paint	 	1
Packing	 	6
Polythene sheeting	 	1
Lubricants		4
Travelling & entertaining	 • •	3
Sundry expenses	 	5
Tools	 	10
Total for the year for one cost centre		2,073
	- The second	

NOTE: Power and depreciation, which are significant in amount by cost centres, are treated as productive overheads.

The company has traditionally been unable to prepare interim accounts of any kind because, with so many products, it has hitherto been unable to resolve the problem of reliably ascertaining interim valuations of stock and work-in-progress. Thus, no information is available to management for control purposes beyond that described above. The accounting and control arrangements for materials bought and consumed are extremely weak and the directors, dissatisfied also with the information about indirect labour by productive cost centres, have sought your help in improving the company's costing system.

You are required to:

- (a) prepare a flow chart of materials bought and consumed to show the system of accounts and the type of accounting and costing entries which you would recommend the company to adopt to establish effective control of materials and to provide information essential for management, amplifying the chart with any additional notes which you consider necessary to explain the nature and purpose of the system.
- (b) prepare notes discussing the weaknesses of the present analysis of indirect labour being maintained by cost centres and indicating the nature of and reasons for any additional account headings which you recommend should be introduced, and
- (c) prepare notes discussing, in the circumstances disclosed by the summary of results and the other explanations given, the usefulness of the secondary allocation of expenses being maintained by cost centres and indicating any changes which you would recommend. (ICA III: 11/67)

SUGGESTED ANSWERS

- 1. (a) Code numbers offer the following advantages over the full names of stores items:
 - (i) when the code is familiar, it can be written or keyed in more quickly than the full name onto lists, bin cards, orders, requisitions, etc.
 - (ii) a numerical code is more easily represented and processed than an alphabetical name in most business machines. Add-listing machines and the simpler accounting machines do not have alphabetical printing except for a few standard headings. Names can be represented in punched cards but require more columns than the equivalent codes, and sorting (e.g. by digit group) is facilitated by numerical codes
 - (iii) where data has to be transmitted, e.g. by teleprinter or teleprocessing, it is quicker to send it in condensed form, and therefore cheaper where there is a time rental on the channel
 - (iv) condensed data can be more compactly stored, and is also more conveniently accessed and received
 - (v) a progressive decimal code ensures that like items are grouped together and duplication (e.g. under different names) is eliminated, thus reducing the number of stock items, and the average value of stock held
 - (vi) a stores code may interlock with the accounts code so that a separate account may be provided for each class or group of stock items.
 - (b) A simple stores classification code could be built up on the progressive decimal basis as follows:

Metal washers				
Wood washers	•		2 3	
Plastic washers			3	
etc.				
Steel washers			11	
Chromium washers			12	
Aluminium washers			13	
etc.				
Steel washers — 3"	diameter	1	12	
Steel washers $-\frac{\frac{1}{2}''}{-\frac{3}{4}''}$,,	1	13	
<u> </u>	,,	1	14	
$1\frac{1}{2}''$,,	1	16	
etc.				
Steel washers $-\frac{1}{2}$ dia	ameter	_ 5	gauge	1121
		- 8	,,	1124
		- 10		1126
		- 12	,,	1121
			etc.	

- (c) Hardwood $1\frac{1}{2}$ " x $\frac{5}{8}$ " would be 20305 Softwood $4\frac{1}{2}$ " x $\frac{3}{4}$ " would be 10906 11915 represents Softwood $9\frac{1}{2}$ " x $1\frac{7}{8}$ " 21512 represents Hardwood $7\frac{1}{2}$ " x $1\frac{1}{4}$ "
- (d) Dowelling could take initial digit 3. If diameters can be given in \(\frac{1}{8}\)" then digits 2 and 3 can represent this in eighths. Digits 4 and 5 are not required, and should therefore be zero (do not shorten the length of the code).
 \(\frac{3}{4}\)" diameter dowelling would then be 30600.
- 2. If the number of categories of purchase is not more than 6-10, invoices may be entered and analysed in a purchases day book with analysis columns. At the end of the month, analysis columns are totalled, cross-checked to the total column, and posted to the relevant accounts.

If there is a large number of categories, analysis columns become unwieldy. An alternative is *random* posting, item by item from the invoices to the relevant accounts, or *exhaust* posting, in which all items for a single account are picked out and entered on an adding machine, and the total posted to the relevant account, then the next account, and so on. Exhaust posting is more suitable where most items are for relatively few accounts.

Since the invoices are not unit media, physical sorting methods are not possible.

- 3. (a) Comments on Report by Machine Section Clerk:
 - (i) It does not appear that the necessity or benefits of work cited have been examined;
 - (ii) Given that the work is necessary, alternative methods of doing it have not been investigated. For instance, the purchase and sales ledgers may be replaced by the slip system: this might save the cost of a further machine;
 - (iii) Even if these jobs can only be done on accounting machines, and the workload data is accurate, this accounts for only 18 working days a month for 2 machines and 2 operators. (Generally it is essential to have a third operator to allow for one being on leave and one sick during crucial times such as the payroll run, but this is still no case for a third machine unless both machines are ever likely to be out of order at such a time);
 - (iv) 250 postings a day (or roughly one every two minutes) is a poor daily standard, but if this includes (a) checking document authorisation, (b) obtaining authorisation where necessary, (c) sorting invoices etc. by supplier, and (d) filing documents, it could be improved, since the four jobs mentioned are not machine work and could be done by any clerk;

(v) there is no mention of what an additional machine and operator would cost (we are being asked to sign a blank cheque), nor is there any estimation of benefits such as overtime to be saved, discounts receivable to be saved, reduction in the average payment period for creditors, or faster preparation of management reports and accounts.

The following matters should be investigated further:

- (i) the procedure by which fully perfected documents arrive at the machine section;
- (ii) the organisation of the machine section so that operators spend the maximum time actually operating the accounting machines, e.g. the relevant ledger accounts may be "pulled" by clerks in readiness for the operator or posting media may be "stuffed" against the relevant accounts in the ledger tray;
- (iii) the utilisation of machine time;
- (iv) the training and supervision of the operators;
- (v) the economic batch size may be larger than 200, as there are fixed costs in setting up for a batch run; on the other hand the larger the batch, the less up-to-date the information;
- (vi) the availability of a further machine and operator (there may be a long delay on a machine order and it may be necessary to recruit and train an operator);
- (vii) the incremental costs, including capital cost, operating costs, and maintenance cost, and benefits of any proposed system.
- 4. The following is an outline of a system for controlling the flow of work through a group of five accounting machines. It is assumed that the group is an organisational unit under a supervisor or manager.
 - (i) the total work load must be assigned to the five machines, so that each operator has a continuous flow of work suitable to her speed of operation (allowing that not all operators are equally fast, efficient or well-trained), and allowing for transfer of work during leave and sickness, e.g.
 - Machine No. 1 Postings to Sales Ledger A-H/Payroll 1st week of month
 - 2 Postings to Sales Ledger I-P/Payroll 2nd week
 - 3 Postings to Sales Ledger Q-Z/Payroll 3rd week
 - 4 Postings to Bought Ledger/Payroll 4th week
 - 5 Postings to Stock Ledger, and Cost Accounts

- (ii) the supervisor should liaise with Invoicing, Cashier, Purchasing, Stock Control and Wages Departments so that he will know beforehand what volume of entries he will get
- (iii) from the above, he should prepare a work programme showing what work is to be completed by each machine on each day of the month e.g. payrolls must be completed according to pay days; each day's batch of invoices, cash receipts, etc. should be posted the following day, etc.
- (iv) each operator should be consulted and her co-operation sought in the planning and programming of her work; as far as possible she should be encouraged to plan and control her own work
- (v) progress charts may be kept where they are visible to both supervisor and operators; the following form of progress chart is suggested:

	MACHINE ROO	M	M PROGRESS CHART						
Machine			Day						
		1	2	3	4		30	31	
1	Post copy invoices to Sales Ledger A-H								
.1	Post cash receipts to Sales Ledger A-H								
1	Payroll – 1st week								
2	Post copy invoices to Sales Ledger I-P								
etc.	etc.								

Boxes should be filled in as each day's batch is completed. For finer control, a code may be used, e.g. could mean job started, and | job completed.

Entries on the chart should be made only by the supervisor, who should investigate any arrears.

(vi) records should also be kept of the number of items posted each day, and the number of operator hours each day so that standards of performance can be built up. Reasonable long term standards would be 60 postings (line-entries) per operator hour, and 40/50 payroll lines per hour

- (vii) all pre-listing, entries in Control accounts, etc. should be performed outside the unit so as to preserve internal control
- (viii) clerks, not operators, should sort media and select ledger cards before each posting run so that machines are not idle.
- 5. (a) Factors to be considered in establishing priorities for the transfer of work to a computer are mainly economic and technical, as follows:
 - (i) any job which can be done equally well on the card installation or the computer should be done where it costs least. While there is spare capacity on both installations, the relevant costs are the marginal costs only (cards, power, stationery,) since the card installation is to be gradually discontinued
 - (ii) where time is limited (and this stage is soon reached), time should be allocated to jobs according to their respective benefits. All requests for computer services should show the benefits expected in rupees. Ill-defined benefits such as "better management information", "improved customer service", "reduction in clerical errors", etc. should not be accepted. A 1967 survey of computers in the U. S. showed that 67% were not paying for themselves; strict financial discipline is therefore necessary.

To avoid optimistic assessment of benefits appropriate adjustments should be made to the budgets of requesting departments.

- (iii) some work cannot be performed at all on a punched card installation or can be performed much more conveniently on a computer, because of the latter's superior logic capabilities. For instance, the work for the research and development and marketing departments may be of a complex mathematical type which could not be done on a punched card calculator. (An electronic punched card calculator reads data from punched cards, performs the four basic arithmetical functions $(+-x \div)$, and punches the results into the same or other cards. Simpler calculators work from instructions punched into the data cards. powerful calculators work from a limited programme set up on a plugboard and can make simple logical decisions. A computer, however, has a programme stored within its memory and can select the appropriate instructions. Programmes and data may be fed in by punched cards, but for the computer this is only one form of input amongst others)
- (iv) some applications (jobs) are more easily programmed than others. It may be wise, especially if systems analysts and programmers lack experience, to concentrate first on

- simpler routines, progressing to more complex jobs as the department gains experience and confidence
- (v) for some standard applications, e.g. payroll, stock control, and dividend payments, there are package programmes which the computer manufacturer provides free from his library
- (vi) experience in the punched card installation will indicate which jobs are difficult to complete in the required time. For instance, if the payroll has to be made up for the last day of the week, and time cards cannot be made available earlier than the previous day, this may always be a rush job, requiring considerable overtime, and with a high risk of delay. This is then a candidate for the computer, which has a higher processing speed
- (vii) some jobs have a higher "publicity value" for the computer department than others. If management are doubtful about the value of the computer, it may be better to make a success of some job which has high management visibility e.g. a spectacular reduction in stock levels or smoothing out a troublesome area of administration, rather than take over a routine accounting function which excites no interest
- (viii) the computer department may also be pressed to prefer one job to another by interested managers.
- (b) In the long run, the computer department must improve the company's profitability. Therefore (i) and (ii) above are the main considerations in the long term. The importance attached to other factors is indicated in the context; some are transitional only.

Pressure on the computer department based on criteria other than long term company objectives should be resisted.

6. (a) External delay and most of the internal delay can be avoided if the liability can be raised on the goods received note. This means that GRN's must be priced and extended, so that the value of goods can be debited to stores and credited to creditors. Prices may be obtained from orders in the case of firm price orders, or suppliers' price lists, or directly by telephone in the case of large items, or by estimate from past purchases, or by reference to budget or standard prices. When Invoices are received, they must be married to the respective GRN's so that any price adjustments can be put through. (It is necessary to marry invoices with GRN's in any case before payment can be approved).

One advantage of this procedure is that goods in stock are automatically matched by creditors – no special cut-off procedures are necessary. Also liabilities are recorded as they in fact arise.

In the case of services received, the corresponding documents would be progress records on capital projects, supported by any engineering certificates of work done, and records of continuing non-capital services such as window-cleaning, maintenance, etc. If the rates are known, these can be multiplied out by quantities, and the resulting costs can be credited to creditors and debited to the respective capital projects and expense accounts. (This procedure is also required for the purpose of cost and progress control on projects, so that physical work done can be compared with up-to-date cost figures).

Invoices may be received, date stamped and recorded by the accounting department instead of buying department. Accounts should be sent copies of orders and goods received notes so that they can check non-technical invoices and pass them for payment themselves. Requisitions and orders should be marked with the account to be charged to avoid delays when invoices are received. Invoices issued to other departments for approval should be due dated to ensure that discounts are not missed and that they are not delayed unnecessarily. Accounts must chase invoices not returned by the due date.

If it is not possible to raise liabilities on the goods received note, they must be raised, as at present, on the invoice. Suppliers may be pressed to render their invoices earlier, but this would lead them to expect earlier payment. (The GRN procedure outlined above avoids losing this valuable source of credit). Also the internal delays may be cut by a due date procedure operated preferably by the accounting department.

(b) Interim and year-end accounts should include all liabilities incurred upto the end of each account period. For final accounts this is a statutory requirement. For any account this is a managerial requirement, since the omission of liabilities means either that capital assets are omitted, or that current expenditure is understated. The latter of course would mean that profit is over-stated.

Delay in accounting for liabilities causes corresponding delay in the completion of accounts and management information reports. With regard to capital expenditure, it is difficult to judge how well the company is keeping within budget if the cost figures are in arrears of physical progress. With regard to revenue expenditure, there is the same problem of making realistic comparisons of budget cost, actual cost (in arrears), and output or revenue.

Delays in paying liabilities also upset cash budgets.

- 7. Before a decision is made to purchase a computer for commercial work, the following points should be investigated:
 - (i) what work could be put on the computer?

- (ii) what benefits could be expected (a) by staff savings? (b) by improved control?
- (iii) what personnel would be required, and how would they be trained?
- (iv) who should be Data Processing Manager and to whom should he report in the new scheme of organisation?
- (v) whether there are likely to be staff difficulties, union objections, etc.?
- (vi) how long it would take to programme the initial computer applications, set up files, etc. compared with the lead period from order to installation?
- (vii) what would be the capital and current costs (a) of purchasing? (b) of renting?, and (c) of using a service bureau?
- (viii) would the computer have top level support? is it understood that it might involve knocking down inter-departmental walls and re-shaping the company organisation?
- 8. Memorandum to Board:

PROPOSED COMPUTER

- (1) The feasibility study indicated that we can use a computer effectively but did not specify
 - (i) what jobs the computer is to do
 - (ii) the timetable for training staff, and analysing and programming systems for computer take-over
 - (iii) the performance specification (access times, storage capacity, etc.) that would be required for the above jobs, nor
 - (iv) the best configuration of equipment to meet this specification (best in terms of cost, reliability, etc.).

Bearing in mind the size and importance of the investment, it is essential that we get good answers to the above questions.

(2) We have no one in the company with more than book knowledge in this field. Outside, we can call on the expertise of computer manufacturers and/or management consultants specialising in data processing. A computer manufacturer will do its own feasibility study and produce a formal proposal, answering all the questions above. This is done without charge or commitment. Naturally, the recommended configuration is chosen from the firm's own range of machines.

A management consultant will analyse systems, compare proposals, and make recommendations for a fee. The latter depends on the time taken.

(3) It is recommended that we invite the leading computer manufacturers to make proposals, and ask a good management consultant to compare the proposals and give us his recommendations.

- (4) This may take 3-6 months, then it may be a further 12 months before the initial programmes are written and tested, and the computer installed. In the meantime it is essential that we build up computer experience within the firm. This includes not only training computer systems analysts, programmers and machine operators, but also the clerks who will be preparing data for input, and (most important) the computer users. All middle and senior management must have what is called "appreciation training"; the lack of this has been a major factor in computer failures.
- (5) Trained personnel are very scarce. However, the computer manufacturers provide training and appreciation courses which we can use as soon as an order is placed. It would also be useful to, invite a service bureau to run certain jobs for us, since they also provide certain training facilities.
- (6) We can ask the service bureau to recommend areas for computerisation. The bureau then starts by making a feasibility study or "systems definition", for which a one-time charge is made. (This is not necessarily lost when we acquire our own computer as the bureau bequeathes us the programmes, which may be compatible with our computer).

A selected member of our staff would be allowed to work with the bureau in systems definition and implementation. Also the bureau undertakes the training of clerks who are responsible for accurate input of data, and it involves itself in appreciation training for managers. Thus, while the bureau remains entirely responsible for providing the specified output, our own personnel get experience.

At a recent I.L.O. conference, the service bureau concept was strongly supported as a means of entering into computers.

(7) I recommend that, as a first step, we invite the Service Bureau to look at our company, on a confidential basis, and recommend areas for computerisation.

Management Accountant

9. There are many ways in which office equipment and machines can be effectively applied to office administration. New equipment is being produced all the time and new applications for existing machines are being found daily.

Office machines and equipment can be applied to office administration to effect the following:

(i) A reduction in the time taken to carry out work. For example, book-keeping machines may be used in place of wholly manual methods of writing up ledger accounts and statements, etc. A mechanised system may provide information at an earlier date than before.

- (ii) An increase in the accuracy with which work is carried out. For example, calculating machines may be installed where previously there were no mechanical aids to calculation.
- (iii) An improvement in the form of the end-product of a procedure. For example, the hand-writing of invoice sets can be replaced by typewriting.
- (iv) A reduction in the cost of carrying out work. Mechanisation can reduce the number of employees required to undertake a specific task. This is the fact which is often uppermost in the thoughts of a management when considering the feasibility of a computer installation. Dictating machines can lead to economies in the personnel involved in a typing pool, in so far as time of those personnel is saved while the letter is being dictated.
- (v) Supervisory control of work is facilitated. For example, the automatic provision of check data can be arranged with some types of equipment.
- (vi) An increase in the amount of information available for management control. For example, the installation of equipment may make possible the automatic production of data for stock control. Copying machines facilitate the dissemination of information throughout an office, and improve communication in the business.
- (vii) The merging of several operations into a single operation, so that time is saved as several documents are produced from one posting and errors of transmission are avoided.
- (viii) The cost of storage of information is reduced, and the speed with which reference can be made to data on file is increased.

Before office equipment and machines are installed, the following should be investigated:

- (i) The basic requirements of the job(s) involved.
- (ii) The basic equipment requirements, e.g. the speed and accuracy necessary.
- (iii) The types and makes of equipment available having the basic requirements.
- (iv) The comparative suitability, reliability and flexibility of the equipment in (iii) above.
- (v) The comparative costs of purchase, installation and use of the equipment in (iii) above.
- (vi) The staffing changes involved and the likely reactions of affected employees.
- (vii) The effect of the installation on the overall flow of work.
- (viii) The specific advantages which will accrue from installation, i.e. installation must be justified by the knowledge that concrete benefits will be obtained.

10. Paperwork is the principal means of communicating data and information where data sources, data processors (clerks) and information users are not in personal touch, either face-to-face, or by telephone. Paperwork has the sole advantage, compared with the spoken word, that it constitutes a permanent record or storage.

Paperwork costs time and money and can only be justified by the decision-making value (and ultimately the profit value) of the information provided.

However, this justification is often ignored. Reports once started are continued, irrespective of changing needs; the same details are copied from one form to another, sometimes several times; work is done twice or more times in the name of internal check, which could be provided much more cheaply by carbon paper and control totals; information is called for without any prior comparison of its probable cost and the probable benefit, etc. Therefore, most large organisations have found it necessary to exert a continuous control on paperwork, (and on office work generally).

Clerical work study ("O & M") is the principal tool of control. Work study asks certain basic questions such as, What is being done? (Need it be done?) Who does it? (Need it be done by him?) When does he do it? (Is that the best sequence?) Where does he do it? (Is that the best place?) and How does he do it? (Is that the best method?) From the answers, some work is eliminated altogether, and the rest is recombined or simplified so that the total cost of clerical time, stationery, equipment, etc. is reduced. There is no organisation and no office procedure which cannot benefit from this searching analysis.

Some simple ideas which have been used in chain stores are as follows:

- (i) the cash register till roll or the price tag itself, may be used for sales analysis, accounting and stock control if it carries the item code number as well as the price
- (ii) where data processing is centralised, the original sales record may be in the form of a punched card, pre-punched with the branch number, item number, quantity, price and value. The salesman adds the date, his own number and (if required) the type of customer. Cards are batched and sent daily to Head Office for sales analysis, accounting and stock control
- (iii) branch stock records are kept at selling prices (not cost) so as to facilitate control
- (iv) it is not necessary for branches to keep stock records either in the stockroom or at the counter; re-ordering routines may be based on physical stock levels

- (v) payroll may also be centralised; monthly payrolls may replace weekly payrolls; so far as possible employees may be paid by cheque direct to their bank accounts
- (vi) branch managers may be authorised to make local purchases out of petty cash within certain limits
- (vii) in the Head Office, the Purchases Day Book may be eliminated as a separate operation by creating it as a carbon copy of remittance advices
- (viii) the Bought Ledger may be replaced by a file of unpaid invoices (the ledgerless or slip system)
 - (ix) plates may be embossed for all regular writing, e.g. names of personnel on payslips, suppliers on remittance advices, stock items on orders, and branches on general instructions and correspondence
 - (x) communication between the Head Office and branches may be by telephone or teleprinter; information may be transmitted more rapidly by prerecording it on punched paper tape.
- An electronic digital computer installation consists of a number 11. of machines linked by cables. While there is an almost infinite variety of possible configurations, and it is hardly possible to speak of a "normal" installation, any computer carries out five basic functions - input, storage (or memory), control, arithmetic and output. Typical machines for these functions are as follows:
 - (i) Card reader "reads" punched cards into the central processor or onto magnetic tape.
 - (ii) Paper tape reader reads in punched paper tape.

INPUT

- (iii) Optical character readers can read printed characters on cards or sheets suitably designed and prepared.
- (iv) Magnetic character readers can read characters printed in magnetic ink (much used by banks for sorting cheques).
- (v) Magnetic tape unit contains a spool of magnetic tape and is a cheap and compact form of storage, from which data can be transferred in or out of the computer processor at much faster rates than card and tape readers. However, if the required data is at the far end of the tape, it is necessary to go right through the reel to get it: this is called serial access storage, and is used with batch or serial processing.

STORAGE -

(vi) Disc store or disk pack contains a number of magnetic discs, each with a read/write head which can enter data into the store, or take it out, again at a high rate of transfer. Though this is far more expensive than tape (per million characters of storage), it has the advantage of random access, i.e. any required data can be obtained in a fraction of a second. This is used in random processing and real time systems.

CONTROL AND ARITHMETIC

OUTPUT

(vii) Central processor contains a control unit, arithmetic unit, and a core store. The control unit controls the timing of movements of data and instructions into and out of the arithmetic unit. The latter carries out all arithmetic and logic operations. The core store is the internal storage of the computer and is used only for the programme and current operations.

(viii) Line printer prints out the results of processing on continuous stationery. Output may also be in the form of punched cards, paper tape, or magnetic tape, for further processing.

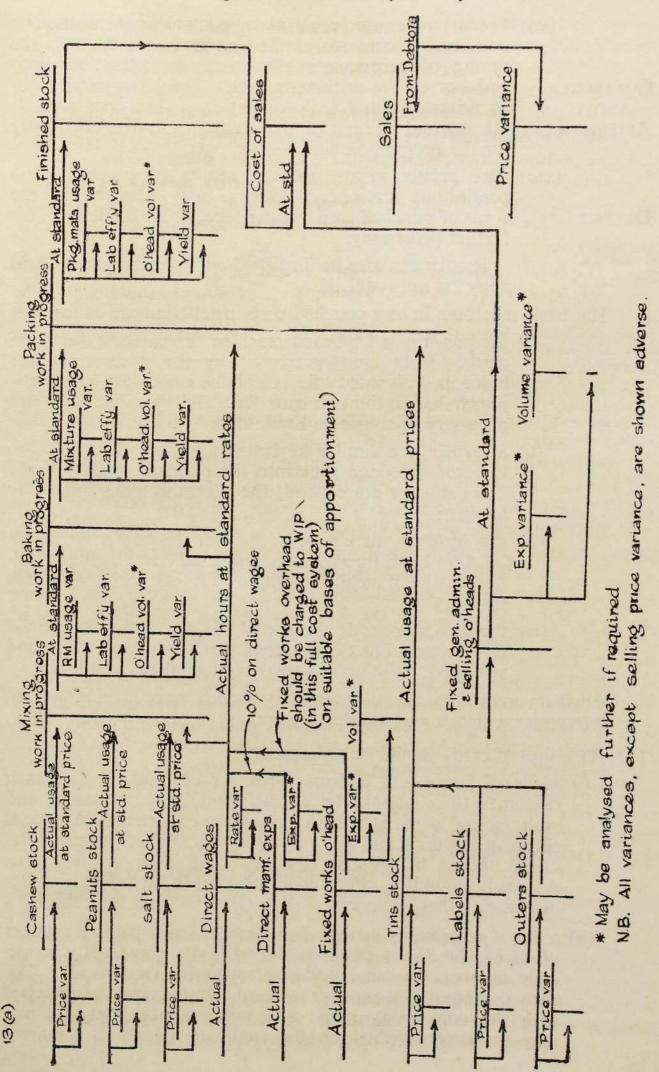
Results can also be displayed on a screen, where "hard copy" is not required.

The basic machines in any punched card installation are as follows:

- (i) the punch is a keyboard machine for entering data into cards. Data are represented by the position of the holes in designated "fields" of the card. An automatic punch has automatic card feed and ejection; it is still necessary of course to key in data
- (ii) a verifier is a similar keyboard machine. Original data is keyed a second time into the punched cards. If the holes do not correspond, the machine locks indicating an error
- (iii) the sorter is an electromechanical device for sorting a batch of cards into pockets numbered 0 to 11 corresponding to the punching positions on one column of the cards
- (iv) the tabulator reads the sorted cards, prints out selected information onto continuous stationery, and adds and subtracts, printing sub-totals and totals as required.

Ancillary machines are the summary punch, reproducing punch, interpreter, collator and multiplying punch.

- 12. Two files of cards should be pre-punched:
 - (i) a file of name and address cards for customers. For each customer there should be a card containing his name and address, and perhaps codes representing customer type, special shipping requirements and any other standing customer data. Cards should be punched for new customers as they arise. All cards should be interpreted and kept in alphabetical order of name so that clerks can easily pull them from the tub file.
 - (ii) a file of commodity cards. For each standard pack, a number of cards should be pre-punched with the commodity name, code number, quantity, price, value, and a credit code. For each commodity, a number of cards should also be punched with the commodity name and code number only. Cards may be gang punched on the summary punch as required.



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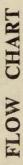
They should all be interpreted and filed in alphabetical order of commodity. The file should be kept up-to-date for changes in standard packs or prices.

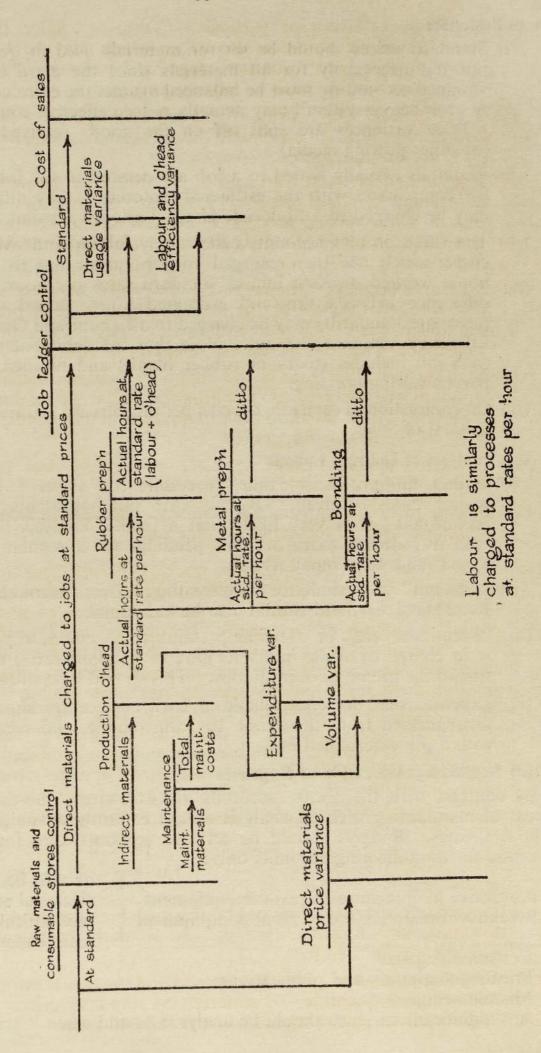
Procedure is as follows:

- (i) allocate a serial number to each order (if not already numbered)
- (ii) for each order in turn, pull the appropriate customer card and one commodity card for each item ordered
- (iii) punch into commodity cards, the order number (which now becomes also the invoice number), date, sales area and any other variable data required for sales analysis
- (iv) verify above
- (v) batch cards daily and run through tabulator creating despatch note/invoice sets on multipart continuous stationery. The summary punch may be linked to the tabulator to punch cards containing invoice totals, for subsequent posting to the sales ledger
- (vi) from the goods received list, pull commodity cards (pre-punched with item and code number only), and punch in date, quantity, debit code, and any other information required in the stock ledger
- (vii) verify above
- (viii) each week, sort sales cards by area, then by standard pack sales in each area and tabulate (sales analysis)
 - (ix) each week sort sales cards, goods received cards and stock ledger balance cards (from previous week) by commodity, and tabulate to create a weekly finished stock ledger. The summary punch should be linked with the tabulator to create new balance cards showing the quantity held of each standard pack at the end of the week.
- 13. (a) See Flow Chart on Page 668.
 - (b) The following variances would be reported monthly:
 - (i) Cashew price variance is the difference between actual and standard price on the month's purchases of cashew. The Purchasing Manager would be asked to explain.
 - (ii) Peanuts price variance— Ditto—(iii) Salt price variance— Ditto—(iv) Tins price variance— Ditto—(v) Labels price variance— Ditto—(vi) Outers price variance— Ditto—
 - (vii) Direct labour rate variance is the difference between actual and standard rates of pay during the month. The Personnel Manager would be asked to explain.
 - (viii) Direct manufacturing expense variance is the over-or under-recovery on this account in the month. The managers of the departments incurring these expenses should be made accountable. Where the amount of expenditure is high, the expenditure variance should be analysed further by cause, e.g. between price and usage.

- (ix) Fixed works overhead variance Ditto –. Since this is fixed, a volume variance also arises which may be broken down further into capacity usage and volume efficiency (depending on the basis of absorption).
- (x) Fixed general administration and selling overhead Ditto overhead N.B. This should be recovered on the volume sold, not on production.
- (xi) Raw materials usage variance is the difference between the actual and standard usage of raw materials (for the actual output of the mixing process) multiplied out at the standard price of each material. It is the responsibility of the Mixing Supervisor.
- (xii) Labour efficiency variance is the difference between actual and standard hours (for the actual output of each process) multiplied out at the standard rates of pay. Each process supervisor is responsible for his own labour efficiency.
- (xiii) Mixture usage variance is the difference between actual and standard quantities of mixture (for the actual baked output), multiplied by the standard price of mixture, and is the responsibility of the Baking Supervisor.
- (xiv) Packing materials usage variance is similar, and is the responsibility of the Packing Supervisor.
- (xv) Selling price variance is the difference between actual and standard price on the actual volume sold.
- 14. (a) It is not clear from the question where the variations in the finished product arise. Since labour in the productive cost centres is at piece rates there must be a limited number of separate "prices" or outputs of each centre. It would be impracticable to have 1000 or more separate piece rates, each based on scientifically determined standard times. It is assumed therefore, that the variation arises in the material specification rather than in labour operations. The rubber blanks must all be different and/or the finished metal parts must all be different, being produced for different end products. Therefore these would be produced only for specific jobs. On this basis, standards can be fixed as follows:
 - (i) the standard price of each raw material used in large quantities
 - (ii) the standard time and labour rate per hour for each of the three productive processes can be expressed as a cost per finished part
 - (iii) the standard overhead rate per hour for each of the productive processes, including maintenance, can similarly be calculated as a cost per finished part.

For each job a numbered job card is opened and the cost is estimated from the required quantities of materials at standard prices, plus the standard labour and overhead cost per finished part.





Note to flowchart

(i) Standard prices should be set for materials used in quantity, but not necessarily for all materials since the extra cost of variance accounting must be balanced against the extra control. A "top-heavy system" may actually reduce effective control.

Price variances are split off on the goods received notes

(or other posting media).

- (ii) Materials actually issued to a job are debited to the job card, for comparison with the estimated materials. Any difference may be charged to a Materials Usage Variance account.
- (iii) The three process accounts collect only labour and overhead costs, which are then charged to jobs according to actual hours worked on each job, at standard rates per hour. Any difference between this and estimated hours (based on the piece rate standards) may be charged to a Labour and Overhead Efficiency Variance account. Note that the debit balance on each job includes stocks of rubber blanks and finished metal parts awaiting bonding.
- (iv) On completion of each job, the cost per the job card is transferred to Cost of Sales.

(b) Analysis of Indirect Labour

- (i) "Other non-productive time" accounts for about \(\frac{1}{4} \) of the typical analysis given. Over a year this represents about Rs. 27,000. It is very likely that a further analysis of this, even introducing extra account pendings on a regular basis, would more than repay its cost.
- (ii) "General" is similarly unrevealing. This accounts for Rs. 23,000/year, and should also be examined.
- (iii) "Premiums" may be overtime premiums. A common practice is to charge overtime hours to jobs at standard rates, and to spread the premium over all jobs. This should be confirmed.
- (iv) Expenses that are controllable at each cost centre should be distinguished from those not so controllable, and compared with a pre-determined budget.

(c) Secondary Allocation of Expenses

By contrast with the above, accounts are excessively sub-divided; the cost of maintaining such an analysis almost certainly outweighs the potential savings. Budgets should be set and accounts kept for each cost centre for the following accounts only:

Preventive maintenance of plant & equipment Breakdown maintenance of plant & equipment

or split between electrical and mechanical maintenance

Consumable parts
Printing, stationery and publications
Miscellaneous
Any significant variance should be analysed as and when it arises.

LOGARITHMS OF NUMBERS

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1	.0792				0934	0607 0969	0645			0755	35	4	8 1 7 1 7 1	15	19 18 18	23 22 21	27 26 25	31 30 28	35 33 32
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16	.2041	2068 2330	2095 2355	2122 2380	2148 2405	2175 2430	2201 2455	2227 2480	2253 2504	2279	26 25	3	5 8	10	12	16 15	20 18 17	22 21 20	25 23 22
119	.2553	2810	2833	2856	2878	2900	2923	2945	2967	2989	22	2 2	5 7		12 11	14 13	521152	19 18	21 20
21	.3010 .3222 .3424	3243	3263	3284	3304	3324	3345	3365	3385	3404	20	2	4 6	8	10	13 12	15 14	17 16	19
23	.3617	3636	3655	3674	3692	3711	3729	3747	3765	3784		2 2	4 (9	11 11 11	13 13 13	15 15 14	17 17 16
26	.3979	4166	4183	4200	4216	4232	4249	4265	4281	4298		2 2	3 5 3 5 3 5 3 5	7 6	9 8	10 10	12 11	14 13	15 14
27 28 29	.4314 .4472 .4624	4487	4502	4518	4533	4548	4564	4579	4594	4609	16 15	2 2 1	3 5 3 5 3 4	6 6	8 8 8 7	9 9	11 11 10	13 12 12	14 14 13
30 31	.4771 .4914	4928	4942	4955	4969	4983	4997	5011	5024	5038	14	1	3 4	6 5	7 7 7	8	10 10	11	13
32 33 34	.5051 .5185 .5315	5065 5198	5079 5211	5092 5224	5105 5237	5119 5250	5132 5263	5145 5276	5159 5289	5172 5302	13	1 1 1 1 1	3 4	5 5	7 7 6	8 8	9	11 10 10	100000000000000000000000000000000000000
35	.5441	5453	5465	5478	5490	5502	5514	5527	5539	5551	1		2 4 2 4		6		8	10	11
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41 42	.6128 .6232 .6335	6138 6243	6149 6253	6160 6263	6170 6274	6180 6284	6191 6294	6201 6304	6212 6314	6222 6325	10	1 1 1 1 1 1 1 1	2 3 2 3 2 3 2 3	4 4 4	5 5 5 5	6	777	8 8 8 8	599
44	.6435	6444	6454	6464	6474	6484	6493	6503	6513	6522	1	1 2	2 3	4	5	6	7		9
45	.6532 .6628 .6721 .6812	6542 6637 6730	6551 6646 6739	6561 6656 6749	65/1 6665 6758	6580 6675 6767	6590 6684 6776	6599 6693 6785	6609 6702 6794	6518 6712 6803	LI Commission of the last	1 1 1 1 1 1	2 3 2 3 2 3	4 4	5 5 5 5	6 6 5	7 7 6 6	8 7 7	00 00 00
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51	.7076	7084	7093	7101	7110	7118	7126	7135	7143	7152		1	2	3	3 4		6767	8
52	.7160 .7243	7168	7177	7185	7193	7202	7210	7300	7308	7316		1	2	2	3 4		6 6	
54	.7324	7332	7340	7348	7356	7364	7372	7380	7388	7396	8	1	2 2 2	2	3 4		66	
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55	.7404	7412	7419	7427	7435	7443	7451	7459	7466	7474		1	2	2 2 2 2 2	3 4 3 4		5 6 5 6	
56 57	.7482 .7559	7566	7574	7582	7589	7597	7604	7612	7619	7627		1	2	2	3 4		5 6	
58	.7634	7642	7649	7657	7664	7672	7679	7686	7694	7701		1	2	2	3 4	4	5 6	7
59	.7709	7716	7723	7731	7738	7745	7752	7760	7767	7774		1	1	2	3 4	4	5 6	7
60	.7782	7780	7706	7803	7210	7818	7825	7832	7839	7846	7	1	1	2	3 4	4	5 6	6
61		7860	7868	7875	7882	7889	7896	7903	7910	7917		1	1		3 4	4	5 6	6
62	.7924	7931	7938	7945	7952	7959	7966	7973	7980	7987		1		2	3 3		5 6	
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65	.8129	8136	8142	8149	8156	8162	8169	8176	8182	8189			1	2	3 3		5 5	
	.8195	8202	8209	8215	8222	8228	8235	8241	8248	8254		1	1	2	3 3		5 5 4 5	
68	.8261 .8325	826/	82/4	8280	8287	8293	8363	8370	8376	8382		1	1	2	3 3		4 5	
69	.8388	8395	8401	8407	8414	8420	8426	8432	8439	8445		1	1	2 2	3 3	4	4 5	
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72	.8573										0	1	1		2 3	4	4 5	5
73	.8633	8639	8645	8651	8657	8663	8669	8675	8681	8686		1	1	2	23	4	4 5	5
74	.8692	8698	8704	8710	8716	8722	8727	8733	8739	8745		1	1	2	2 3	4	4 5	5
75	.8751	8756	8762	8768	8774	8779	8785	8791	8797	8802		1	1	2	2 3	3	4 5	5
	.8808	8814	8820	8825	8831	8837	8842	8848	8854	8859		1	1	2	2 3 2 3	3	4 5	5
77	.8865											1	1	2	2 3	3	4 4	
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87	.9395	9400	9405	9410	9415	9420	9425	9430	9435	9440			1		22	3	3 4	4
88	.9445	9450	9455	9460	9465	9469	9474	9479	9484	9489		0	1	1	22	3	3 4	4
89	.9494	9499	9504	9509	9513	9518	9523	9528	9533	9538		0	1	1	2 2	3	3 4	4
90	.9542	9547	9552	9557	9562	9566	9571	9576	9581	9586		0	1	1	2 2	3	3 4	5
91	.9590	9595	9600	9605	9609	9614	9619	9624	9628	9633		0	1	1	2 2	3	3 4	4
92	.9638	9643	9647	9652	9657	9661	9666	9671	9675	9680		0	-		2 2 2 2	3		4
94	.9685	9736	9741	9745	9750	9754	9759	9763	9768	9773		7000	1	17200	2 2 2	3	3 4	4
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95	.9777	9782	9786	9791	9795	9800	9805	9809	9814	9818			1	1363	2 2	3	4 4	
97	.9823 .9868	9877	9832	9881	9886	9845	9850	9854	9859	9863			1 1		2 2 2 2	3	3 4 3 4	
	.9912	9917	9921	9926	9930	9934	9939	9943	9948	9952		0	-	1	22	3	3 4	4
99	.9956	9961	9965	9969	9974	9978	9983	9987	9991	9996	4	100		100000		2	3 3	4
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.10 1259 1262 1265 1268 1271 1274 1276 1279 1282 1285 .11 1288 1291 1294 1297 1300 1303 1306 1309 1312 1315 3	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$						
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1.18 1514 1517 1521 1524 1528 1531 1535 1538 1542 1545	$ \begin{bmatrix} 0 & 1 & 1 & 1 & 2 & 2 & 2 & 3 & 3 \\ 0 & 1 & 1 & 1 & 2 & 2 & 2 & 2 & 3 & 3 \\ 0 & 1 & 1 & 1 & 2 & 2 & 2 & 2 & 3 & 3 \\ 0 & 1 & 1 & 1 & 2 & 2 & 2 & 3 & 3 & 3 \end{bmatrix} $						
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34 2188 2193 2198 2203 2208 2213 2218 2223 2228 2234							
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.36 2291 2296 2301 2307 2312 2317 2323 2328 2333 2339 .37 2344 2350 2355 2360 2366 2371 2377 2382 2388 2393	1 1 2 2 3 3 4 4 5 1 1 2 2 3 3 4 4 5						
38 2399 2404 2410 2415 2421 2427 2432 2438 2443 2449	112 233 445						
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ANTI LOGARITHMS

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.61 .62 .63	4074 4169 4266	4083 4178 4276	4093 4188 4285	4009 4102 4198 4295 4395	4111 4207 4305	4121 4217 4315	4130 4227 4325	4140 4236 4335	4150 4246 4345	4159 4256 4355	10	1 1 1 1 1 1	2	3	4 4 4 4 4	5 5 5 5 5	6 6 6	777	7 8 8 8 8	8 9 9 9
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.71 .72 .73	5129 5248 5370	5140 5260 5383	5152 5272 5395	5047 5164 5284 5408 5534	5176 5297 5420	5188 5309 5433	5200 5321 5445	5212 5333 5458	5224 5346 5470	5236 5358 5483	12	1 1 1 1	2 2 3	4 4 4 4 4	5 5 5	6 6 6 6	7 7 8	9	9 10 10 10	11 11 11
.77	5888 6026	5768 5902 6039	5781 5916 6053	5662 5794 5929 6067 6209	5808 5943 6081	5821 5957 6095	5834 5970 6109	5848 5984 6124	5861 5998 6138	5875 6012 6152	14	1	3 3 3	4	5	77777	8 8	9 10 10 10	11 11 11	12 13
.81 .82 .83	6457 6607 6761	6471 6622 6776	6486 6637 6792	6353 6501 6653 6808 6966	6516 6668 6823	6531 6683 6839	6546 6699 6855	6561 6714 6871	6577 6730 6887	6592 6745 6902	15	2	3 3 3 3 3	5 5	6 6 6 6	8	9 9	10 11 11 11 11	12 12 13	14 14 14
.86 .87 .88	7244 7413 7586	7261 7430 7603	7278 7447 7621	7129 7295 7464 7638 7816	7311 7482 7656	7328 7499 7674	7345 7516 7691	7362 7534 7709	7379 7551 7727	7396 7568 7745	17	2 2 2	3 3 4	5 5 5 5 5	7 7	999	10 10	12 12 12 12 12 13	14 14 14	15 16 16
.91 .92 .93	8128 8318 8511	8147 8337 8531	8166 8356 8551	7998 8185 8375 8570 8770	8204 8395 8590	8222 8414 8610	8241 8433 8630	8260 8453 8650	8279 8472 8670	8299 8492 8690	19	2 2 2	4 4	6	8 .	10	11 12	13 13 14 14 14	15	17 17
.96 .97 .98	9120 9333 9550	9141 9354 9572	9162 9376 9594	8974 9183 9397 9616 9840	9204 9419 9638	9226 9441 9661 9886	9247 9462 9683	9268 9484 9705 9931	9290 9506 9727 9954	9311 9528 9750 9977	21	2 2 2	4	6 7 7	8 1 9 1	11	13 13 13	15 15 15 15 16	17 17 18	19 20 20

HOW TO USE INTEREST TABLES FOR DISCOUNTING AND COMPOUNDING

1. The present value of a future sum of money can be found from Table A.

Example

(i) What is the present value of Rs. 80,000 to be received in 4 years' time given that money costs (or is worth) 10% per annum? Table A, 10% column, year 4, shows that Re. 1/- has a present value of Rs. 0.683. Therefore, Rs. 80,000 has a present value of 80,000 x 0.683 = Rs. 54,640.00.

(ii) What is the present value of Rs. 80,000 to be paid in 4 years

time, with money at 10% as before.

Answer: - Rs. 54,640.00.

2. The present value of a fixed sum of money every year (i.e. an annuity) can be found from Table B.

Example

(i) Present value of Rs. 10,000 a year for the next 6 years, the first receipt coming at the end of the first year, and so on. Money at 8%. Table B, 8% column, year 6, shows that Re. 1/- a year for 6 years has a present value of Rs. 4.623. Therefore Rs. 10,000/year has a present value of 10,000 x 4.623 = Rs. 46,230.00.

(ii) Present value of Rs. 10,000 a year in perpetuity, with money at 8%, is given by $\frac{10,000}{8}$ x 100 = Rs. 125,000.

(No tables necessary in this case)

- (iii) Present value of Rs. 10,000 a year from the end of year 3 to the end of year 20 is equal to 10,000/year to year 20 minus 10,000/year to year 2. Money at 8% as before. (10,000 x 9.818 (100,00 x 1.783) or 10,000 x [9.818 1.783] = Rs. 80,350.00.
- 3. The present value (P) of a fixed sum of money (A) every k years in perpetuity, beginning after k years, with interest at r% is given by the formula:

 $P = \frac{A}{(1+r)^k - 1}$ (No tables supplied)

Example

The net present value of a machine having a life of 10 years, at 10% cost of capital, is found to be + Rs. 3,000. If this machine is replaced every 10 years with a similar machine, the present value of the series in perpetuity is given by

$$3000 + \frac{3000}{(1.\overline{10})^{10}} - 1$$
= Rs. 4,880

The present value of an annual sum (A) growing at a compound rate 4. of interest (g%), for n years with money at r% is equal to the present value of a fixed sum of $\frac{A}{(1+g)}$ for n years at an interest rate of $\left\{\frac{r-g}{1+g}\right\}$ This may be found from Table B.

Example

(i) The present value of an annual profit currently running at Rs. 15,000/year, but expected to increase by 3% a year compound, for the next 10 years, discounting at 10%, is the same as a fixed annuity of $\frac{15,000}{1.03}$ (= 14,550), discounted at .10-.03 (= 6.8%).

From Table B, 6% column, 10 years, the present value of Re. 1/- per annum is Rs. 7.360. From the 8% column, we read Rs. 6.710. Interpolating for 6.8%:

$$7.360 - + \left\{ \frac{8}{20} \times 0.650 \right\} = 7.100$$

Therefore, present value of series is 14550 x 7.100 = Rs. 103.305

- (ii) Similarly, the present value of an annual profit of Rs. 15,000, growing at 3% p.a. in perpetuity, discounted at 10%, is given by: $\frac{4,550}{.068}$ = Rs. 214,000
- The amount (S) to which a fixed annual sum (A) will accumulate over 5. n years with interest at r % compound is given by the formula: $S = A \left[(1+r)^n - 1 \right]$

$$S = A \left[\frac{(1+r)^n - 1}{r} \right]$$

No tables are provided here for this expression, but it can be calculated by taking the present value of A for n years at r% from Table B, and multiplying by $(1+r)^n$.

Example

What annual sum is required to be invested in a sinking fund at 8% net, to accumulate to Rs. 100,000 after 15 years? From Table B, the present value of Re. 1/- a year for 15 years at 8% is Rs. 8.559. Therefore the terminal value or amount would be 8.559 x $(1.08)^{15}$ = Rs. 27.13.

Therefore to produce Rs. 100,000 the annual investment should be $\frac{100,000}{27.13}$ = Rs. 3686.

N.B. (1.08)¹⁵ can be calculated either by taking the logarithm of 1.08 and multiplying by 15, then anti-logging, or by taking the reciprocal of the present value of Re. 1/- after 15 years at 8% per Table A.

1%	667 444 296 198 132	088 059 009 026 017	012 008 005 003 002	0007			679
50	100000	00-00	0.0000	0.002			
%	690 476 328 226 156	108 074 051 035 024	017 008 008 006	003 002 001 001 001	,		
45	100000	00000	00000	00000			
40%		.133 .095 .068 .048 .035	025 018 009 009	005 002 002 001	001		
%	741 549 60 406 3301 223	165 0 122 0 091 0 067 0 050 0	10.00. 10.00.	23.00.0	0.0		
35%	0.00	0.165 0.122 0.091 0.067 0.050	0.037 0.027 0.020 0.015 0.015	0.008 0.005 0.003 0.002	.002		
%	769 592 455 350 269	207 159 123 094 073	056 043 033 025 020	015 002 009 007 005 005	002000000000000000000000000000000000000	0001	
30	100000	00000	00000	00000	00000	0.001 0.001 0.001 0.001	
28%	.781 .610 .477 .373 .291	227 178 139 108 085	066 052 040 032 025	019 015 012 009 007	000 000 000 000 000 000	902 901 901 901	
	794 0 630 0 500 0 397 0 315 0	00000	1900.0	00000	00000	00000	
26%	0.79 0.63 0.39 0.31	0.250 0.198 0.157 0.125 0.099	0.079 0.062 0.050 0.039 0.031	99999	.008 .005 .005 .004	902 902 901 901	
%	800 640 512 410 328	262 210 168 134 107	086 0 069 0 055 0 044 0 035 0	028 0 023 0 018 0 014 0 001 2	009 007 006 005 004 00.0	003 002 002 002 001 001	
25	00000	00000	00000	00000	00000	0.003 0.002 0.002 0.002	
%	806 650 524 423 341	275 222 179 144 116	094 076 061 049 040	032 026 021 017 017	011 009 006 006 005	9002 0002 0002	
24	0.00.00	0.000	00000	00000	00000	00000	
22%	0.820 0.672 0.551 0.451 0.370	0.303 0.249 0.204 0.167 0.137	19699	.042 .034 .028 .023	.015 .013 .010 .008 .007	900 900 900 900 900 900 900	
%	833 694 579 482 402 (335 0 279 0 233 0 194 0 162 0	135 0 112 0 093 0 078 0 065 0	054 0. 045 0. 038 0. 031 0. 026 0.	022 0. 018 0. 015 0. 013 0.	009 0007 0006 0005 0004 0004	
200	00000	00000	00000	0.000	0.00		0.00
%	847 718 609 516 437	370 314 266 225 191	162 137 116 099	071 060 051 043 037	031 026 022 019 019	Control of the Contro	100
18	62132	00000	00000	00000	00000	00000	<u>-</u>
16%	0.862 0.743 0.641 0.552 0.476	0.410 0.354 0.305 0.263 0.227	195 168 145 125	.093 .080 .069 .060	.044 .038 .028 .028	021 018 016 017 012	8 8
%	228820	32 76 77 77 74 74	115 87 63 63 0 23 0 0	107 093 081 070 061 0	053 0 046 0 040 0 035 0 030 0	20000	0 0
15,	8.0000	0.000	0.100.1	0.00	0.05 0.04 0.03 0.03		0.004
4%	877 769 675 592 519	456 400 351 308 270	237 208 182 160 140	123 108 095 083 073	064 056 049 043 038	The second secon	000
	76273	00000	300.0	00000	00000	00000	0 0
12%	0.893 0.797 0.712 0.636 0.567	0.507 0.452 0.404 0.361 0.322	287 227 229 205 1183	.163 .146 .130 .116	.093 .083 .074 .066	899888	.003
%	909 826 751 683 621	564 513 467 424 386	50 119 00 00 00 39 00 00 00	218 98 80 80 64 64 0 49 0	135 0 123 0 112 0 102 0 092 0		0/600
10	00000	00000	0.0000	0.00	0.0	00000	
%8	926 857 794 735 681	630 540 500 463	397 368 340 315	292 270 250 232 215	199 170 170 158 146		021
	943 0 890 0 840 0 747 0	82729	72977	24 0. 27 0. 33 0. 12 0.	0.000	00000	0 0
%9	0.98	0.705 0.665 0.627 0.592 0.558	0.527 0.497 0.469 0.442 0.417	0.39 0.37 0.35 0.33			
%	962 925 889 855 822	790 760 731 703 676	650 625 601 601 577 555	534 513 494 475 456 6	439 0 422 0 406 0 390 0 375 0	361 0 347 0 333 0 308 0	-
4	00000	00000	00000	00000	00000	00000	
2%	.980 .942 .924 .906	.888 .871 .853 .837 .820	.804 .788 .773 .758 .758	728 714 700 686 673	660 647 634 622 610	598 586 574 563 552	7
	90 0 71 0 61 0 51 0	2332	0.000	28 0. 28 0. 20 0.	00000	0.0000	0
1%	0.96 0.96 0.96 0.96	0.93 0.93 0.91 0.90	0.896 0.887 0.879 0.870 0.861	0.85 0.83 0.82 0.82	0.811 0.803 0.795 0.788 0.788	1,5544	8
Periods until ayment	11111	11111	11111	11111	11111		: :
Periods until payment	2. 6. 4. 2.	© ► ∞ Poi Ped noolahar	tov 100 lanam F m.org aavanah	- Winder on . 2	22222	2628308	20.
- 11	Total Control of the	1	3 33.7 4.7 4.7	9			

TABLE B - PRESENT VALUE OF \$ 1 RECEIVED ANNUALLY FOR N YEARS

20%	0.667 1.111 1.407 1.605 1.737	1.824 1.883 1.922 1.948 1.965	1.977 1.985 1.990 1.993 1.995	1.997 1.998 1.999 1.999	22.000	22.000
45%	0.690 1.165 1.493 1.720 1.876	1.983 2.057 2.108 2.144 2.168	2.185 2.196 2.204 2.210 2.214	2.216 2.218 2.219 2.220 2.221	2.222	2222
40%	0.714 1.224 1.589 1.849 2.035	2.168 2.263 2.331 2.379 2.414	2.438 2.456 2.468 2.477 2.484	2.489 2.492 2.494 2.496 2.496	2.498 2.498 2.499 2.499 2.499 2.500	2.500 2.500 2.500 2.500 2.500 2.500
35%	0.741 1.289 1.696 1.997 2.220	2.385 2.508 2.598 2.665 2.715	2.752 2.779 2.799 2.814 2.825	2.834 2.840 2.844 2.848 2.848 2.850	2.853 2.853 2.854 2.855 2.855 2.856	2.857 2.857 2.857 2.857 2.857 2.857
30%	0.769 1.361 1.816 2.166 2.436	2.643 2.802 2.925 3.019 3.092	3.147 3.190 3.223 3.249 3.268	3.283 3.295 3.304 3.311 3.316	3.320 3.323 3.325 3.325 3.326 3.329	3.331 3.332 3.332 3.332 3.333
28%	0.781 1.392 1.868 2.241 2.532	2.759 2.937 3.076 3.184 3.269	3.335 3.387 3.427 3.459 3.483	3.503 3.518 3.529 3.539 3.546	3.351 3.356 3.559 3.562 3.562 3.564 3.566	3.567 3.568 3.569 3.569 3.571 5.3.571
26%	0.794 1.424 1.923 2.320 2.635	2.885 3.083 3.241 3.366 3.465	3.544 3.606 3.656 3.656 3.695 3.726	3.751 3.771 3.786 3.786 3.799	3.816 3.822 3.827 3.827 3.831 3.837	3.839 3.840 4 3.841 5 3.842 9 3.846
25%	0.800 1.440 1.952 2.362 2.689	2.951 3.161 3.329 3.463 3.571	3.656 3.725 3.780 3.824 3.859	3.887 3.910 3.928 3.942 3.942 3.954	3.963 3.976 3.976 3.985 7.3.985 1.3.988	4 3.990 7 3.992 9 3.994 5 3.995 7 4.000
24%	0.806 1.457 1.981 2.404 2.745	3.020 3.242 3.421 3.566 3.682	3.776 3.851 3.912 3.962 5.3.962	4.033 4.080 4.080 4.097 4.110	4.14.4.4.4.4.4.13.12.15.15.15.15.15.15.15.15.15.15.15.15.15.	4.154 8.4.157 1.4.159 4.4.160 5.4.166 5.4.167
22%	0.820 1.492 2.042 2.494 2.864	3.167 3.416 3.416 3.786 3.786	4.035 4.127 4.203 1.4.265 5.4.315	4.357 4.391 4.442 4.442 5.4460	4.476 9.4.488 5.4.499 7.4.507 8.4.514 6.4.520	4.524 0.4.528 5.4.531 9.4.534 7.4.544 9.545 9.545
20%	0.833 1.528 2.106 2.589 2.589 7.2991	3.326 3.605 3.837 4.031	4.327 4.439 4.533 4.611 2.4.675	2 4.730 3 4.812 5 4.844 3 4.870	4.891 0 4.909 2 4.925 1 4.937 7 4.948 0 4.956	2 4.964 2 4.970 0 4.975 7 4.979 4 4.999
18%	0.847 1.566 2.174 2.690 4 3.127	3.498 3.812 4.4078 4.494 4.494	4.656 4.793 2.4.910 8.5.008 5.092	9 5.162 9 5.222 8 5.273 7 5.316 9 5.353	5.38 6.43 5.45 5.45 5.48	5 5.49 5 5.50 7 5.51 6 5.55
16%	0.862 1.605 2.246 2.798 3.274	1 3.685 4.039 7 4.344 2 4.607 9 4.833	5.029 1 5.197 3 5.342 4 5.468 7 5.575	4 5 669 7 5.749 8 5.818 8 5.877 9 5.929	2 5.973 9 6.011 9 6.044 4 6.073 1 6.118	6.13 6.15 6.16 6.17 6.23 6.24
15%	7 0.870 7 1.626 7 2.283 4 2.855 3 3.352	3.784 8 4.160 9 4.487 6 4.772 6 5.019	3 5.234 0 5.421 2 5.583 2 5.724 2 5.847	5 5.954 3 6.047 7 6.128 0 6.198 3 6.259	7 6.312 3 6.359 2 6.399 5 6.434 6 6.491	5 6.514 1 6.534 3 6.551 3 6.566 5 6.642 3 6.661
14%	0.877 0.877 2.322 2.322 7.2914 3.433	1 3.889 4 4.288 8 4.639 8 4.946 0 5.216	7 5.453 4 5.660 4 5.842 8 6.002 1 6.142	4 6 265 0 6.467 0 6.467 6 6.550 9 6.623	2 6.687 5 6.743 8 6.792 4 6.835 6 6.906	3 6.935 4 6.961 2 6.983 5 7.003 4 7.105 4 7.133
112%	0.893 5 1.690 7 2.402 3.037 3.605	\$ 4.111 \$ 4.564 \$ 4.968 \$ 5.328 \$ 5.650	5 5.937 4 6.194 3 6.424 7 6.628 6 6.811	24 6.974 22 7.120 01 7.250 65 7.366 14 7.469	9 7.562 2 7.645 3 7.718 5 7.784 7 7.843 1 7.896	37 7.943 07 7.984 70 8.022 27 8.055 79 8.244 15 8.304
10%	0.909 1.736 7.2.487 2.3.170 3.3.791	3 4.355 6 4.868 7 5.335 0 6.145	9 6.495 6 6.814 4 7.103 4 7.367 9 7.606	80.80.80	8.64 9.888 9.888 5.99 7.09 9.161	4.0 9.3 9.9 9.9 9.9
%8	0.926 1.783 2.577 3.312 3.993	5.206 5.206 5.747 6.247 6.710	7.139 7.536 7.904 8.244 8.559	8.851 9.122 9.372 9.604 9.818	10.017 10.201 10.371 10.529 10.675	10.93 11.05 11.25 11.92 11.92
%9	0.943 1.833 2.673 3.465 4.212	4.917 5.582 6.210 6.802 7.360	7.887 8.384 8.853 9.295 9.712	10.106 10.477 10.828 11.158 11.470	11.764 12.042 12.303 12.550 12.783 13.003	13.211 13.406 13.591 13.765 15.046 15.762
4%	0.962 1.886 2.775 3.630 4.452	5.242 6.002 6.733 7.435 8.111	8.760 9.385 9.986 10.563 11.118	11.652 12.166 12.659 13.134 13.590	14.029 14.451 14.857 15.247 15.622 15.983	16.330 16.663 16.984 17.292 19.793 21.482
2%	0.980 1.942 2.884 3.808 4.713	5.601 6.472 7.325 8.162 8.983	9.787 10.575 11.343 12.106	13.578 14.292 14.992 15.678	17.011 17.658 18.292 18.914 19.523 20.121	20.707 21.281 21.844 22.396 27.355 31.424
1% 2	0.990 1.970 2.941 3.902 4.853	5.795 6.728 7.652 8.566 9.471		14.718 15.562 16.398 17.226 18.046	18.857 19.660 20.456 21.243 22.023	23.560 24.316 25.066 25.808 32.835 39.196
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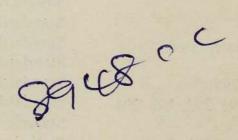
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