QUANTITY SURVEYOR

'91/92

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UNIVERSITY OF MORATUWA,
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Our Thanks.

Message

Chief Guest

In virtually every activity that mankind undertakes, a control machanism is essential, so that final outcome may be predicted within and acceptable threshold of accuracy, and that the implications of the process through which the goal is achieved can be assessed.

The specific, but extreamly important area of construction is no exception. The process by which buildings and infrastructure are procured in modern society must be controlled.

Construction projects, like the activities of many other industries must be controlled in three ways. That is in terms of time, cost and quality. It can however be argued that time is money, and quality is related to value, and thus all control is centred on the critical subject of cost

Effective cost control in construction is vital, so as to ensure that a project is produced within the allocated budget. The client must know howmuch his building is going to cost up front, and not retrospectively. The size, quality, scope a project, and even the decision of whether build, will be influenced by a predicted cost. If the predicted cost is exceeded by the actual cost, then the viability of a project may vanish, possibly leaving the client bankrupt, the building abondaned and resources wasted.

The complexity, and the unique nature of the vast majority of building projects, makes cost reliable prediction difficult. The problem is futher exacerbated by the industry's changing environment. Today, more than ever before, clients are demanding precise cost estimates, essential for success in today's harsh economic environment.

Controlling the cost of construction, is a complex process, requiring the analysis of numerous and interacting cost functions. Futher, the evaluation of alternative options on an equal performance basis is of paramount importance. At the same time it is important to remember that cost control is highly fragmented industry as construction requires a particular expertise capable of taking a scientific and systematic approach to the problem,

he seminar organised by the Quantity Surveying undergraduates highlights he need for professionals in the industry who are concerned with the lanning, monitoring and controlling of resource allocation, whilst faced with and increasingly volatile economic environment.

he young men and women of the Department of Building Economics who have identified the need of cost control in construction should be highly commended.

I wish you well

Dr. M. E. Joachim
Secreatary to the minister of state
or Construction and Building Materials.

Message

Chairman, University Grants Commission

It is a pleasure to be asked to contribute a Message on the occasion of the production of this Magazine.

The Department of Building Economics has gone from the strength to strength in the last few years largely because it has had to endure a certain number of problems. This little is of interest because the University Grants Commission has been concerned with the University system as a whole developing better costing and cost control methods. If the Department of Building Economics could by public seminars of the nature described and also by interaction with the colleagues in the University of Moratuwa and through that University with other universit-es, could bring about a better cost consciousness in the University system as a whole (whichd is after all involved in the construction of younß Graduates) that I would regard as a great achievement !

The new generation who have graduated from the University are able, I am sure, to make an impact on the construction industry in Sri Lanka and I would congratulate both the staff and tbe undergraduates and recent graduates for the contribution they are all making to the develop-ment of the Profession.

Professor A. P. R. Aluvihara

Message

Chancellor

I am pleased to send this message to the Quantity Surveyor 1991/92 magazine being published by the Department of Building Economics of the University.

Quantity surveyors play a crucial role in construction, and the Department should be congratulated for their commitment to excellence in this field.

I wish the undergraduates and the faculty all success in their endeavours.

Vidya Jyothi Dr. Arthur C Clarke, CBE
Chancellor : University of Moratuwa

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Massage

Vice Chancellor, University of Moratuwa.

Two matters are very clear when one examines the role of construction in a developing country. Firstly, the growth of the economy is very much linked to the expansion in construction activities. Secondly, one has to learn to work within a restrictive budget and subject to price escallations.

It is very evident that professionals well trained and qualified in Quantity Surveying and Building Economics are going to play a wider and an important role in the development activities of a country such as ours.

As such we must thank all those who helped to establish and to conduct this course at the University of Moratuwa amidst a great deal of hardships.

It is also my pleasant duty to congradulate the graduates of the first batch and sincererly thank the staff members who have worked really hard, especially the untiring Head with all smiles Mrs. Chithra Weddikkara and collegues from overseas. I also thank the organisers of the activities connected with this publication.

Prof, G. T. F. Silva
Vice Chancellor
University of Moratuwa

Message

From Dean

The first batch of Quantity Surveying students has graduated. The Chair in Quantity Surveying has been filled by Prof. P. G. K. Fernando a prominent personality in the field of Construction. Mrs. Chitra Weddikkara continues as the Head of the Department.

The period of uncertainty in the Department of Building Economics has ended. The Department is now in the process of developing and re-constructing the Course content to fall in line with International Trends. Very soon, the Department will also embark on the establishment of several new courses.

I congratulate the Staff and Students on their achievements so far.

The Faculty of Architecture as a whole, is now involved in a process of "LOOKING BACK AND QUESTIONING" the suitability of the courses they conduct to effectively participate in the continuing process of Economic Development in the country. The declared objective still being, "National but International".

The Faculty has realised the need to have links with internationally known Academic Institutions in order to maintain standards, whilst some of those Institutions have seen the potential of the courses conducted in our Faculty. Very fuitful discussions have taken place as regards to future development of the courses, teaching and staff training.

The Faculty requires the support and co-operation of all concerned to achieve its objectives. In this regerd, I wish to thank the Head and the Staff of the Department of Building Economics for their contribution towards the said common objectives.

Archt Prof. **Lakshman Alwis**
Dean, Faculty of Architecture

Message

Head, Department of Building Economics, University of Moratuwa.

The skill of the professional Quantity Surveyor have been developed over many decades, and are such that the Q. S. is been an essential person in the design and construction team.

The Q. S. has the ability to manipulate both quantity and quantitative information, and thus can develop and the use cost information. The Q. S. 's in - depth understanding of the construction process and the financial implications of design decisions, this coupled with the above form a powerful combination in advising on the most cost effective way of designing, constructing, and administrating the client's project.

As the Sri Lankan construction industry and economy develops to meet her own growing requirements, and to participate in internationa trade, including international construction contracts, the Sri Lankan construction industry must prepare itself for operation in an increasingly fierce and competetive market. Accordingly, efficient, accurate and reliable cost control will become increasingly important.

The presently underdeveloped but rapidly growing profession of Quantity Surveying possesses the cost controlling expertise required in construction, and thus has tremendous future responsibility in the development of the Sri Lankan construction industry.

The decesion to organise a seminar on cost control in construction by the undergraduates of the Department of Building Economics is a reflection of its importance. It is our intention that this seminar would project its relevance to the industry and project who are able to offer such services.

Mrs. C. Weddikkara

With Best Complements

From

THE STATE ENGINEERING CORPORATION OF SRI LANKA

Message

Professor, Department of Building Economics, University of Moratuwa

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I am pleased to send this message to the 2nd Publication of the "Quantity Surveyor" magazine of the University of Moratuwa.

It is very creditable that the final year students of the Department of Building Economics have taken the initiative to continue a tradition started by their predecessors which if maintained over the years will, no doubt, become an important vehicle for the promotion of Quantity Surveying as a profession in Sri Lanka.

It is also significant that this publication will coincide with the holding of an important seminar "Cost Control in Construction" organised by the students where serious concerns for cost related issues will become expressed. A student initiative in such an exercise demonstrate the maturity of the students in the department and augurs well for the future.

It is my hope that the students to follow will continue this laudable initiative, so that, by this means a vehicle for expression for the Quantity Surveying student on important issues will be assured.

Professor **P. G. K. Fernando**

Message

Institute of Quantity Surveyors in Sri Lanka

We consider it is a priviledge to send this message to the "Quantity Surveyor 92" which is the second publication of the undergraduates of the Department of Building Economics of the Moratuwa University. This Institute is proud to have associated itself with the Department of Building Economics right from its inception. It is indeed fitting that the first President of the Institute of Quantity Surveyors in Sri Lanka, the late Professor H. P. S. Caldera became the first Professor and Head of the Department of Building Economics.

We note with pleasure that the first batch of Quantity Surveyors graduated last year, thus fulfilling a much felt need in the industry. t is also gratifying to note that all these graduates have secured good positions in leading Consultancy and Construction Organisations in Sri Lanka. It is our view that the standards maintained by the Department are extremely good and acceptable to the organisations involved in the Building Industry in Sri Lanka.

It is our duty to thank the undergraduate for organising this memorable event and wish this seminar a success.

A. D. P. Gunaratne
Secretary

Review of Public Awareness In Quantity Surveying

The Quantity Surveying undergraduates of the Department of Building Economics, Faculty of Architecture of University of Moratuwa successfully conducted their inaugural dinner and Forum on "Public Awareness of Quantity Surveying" at Regency Hall of the Mount Lavinia Hotel on 7th December 1990. The Minister of Education and Higher Education Hon. Lalith Athulathmudali was the Chief Guest. A large number of distinguished guests viz; Secretaries and State Secretaries of Ministries, Academics, Engineers, Architects, Quantity Surveyors, Economists, Policy Makers, Administers, Lawyers, Representatives from the international organisations were present on the occasion.

The welcome speach was made by Mrs. Chitra Weddikkara, Head of the Department of Building Economics, University of Moratuwa. The other speakers were Professor K. R. S. Peiris, Dean/Faculty of Architecture, University of Moratuwa, Professor G. T. F. de Silva, Vice-Chancellor, University of Moratuwa, Professor A P, R. Aluvihare, Chairman. University Grants Commission. After introducing the Chief Guest by Mr. M. L. de Silva, Senior Lecturer of the Department of Building Economics, University of Mortuwa the Minister in his address stated that the future Quantity Surveyors have an important role to play in the national development program of the country. This is due to these graduates being the future managers of scarce resources, and will be the professionals implementing cost control systems which will control the waste, corruption and inefficiency in the construction industry which forms nearly 1/10 th of the Gross National Product. In order to be successful he also stated that those graduates should demonstrate excellence and prove their ability in all aspects of their work.

A panel discussion on "The importance of Quantity Surveying" was held thereafter, where professionals from three main disciplines namely Architecture, Engineering and Quantity Surveying in the construction industry gave their expert comments. Professor Lakshman Alwis, Head of the Department of Architecture, University of Moratuwa was the

convener of the panel discussion. Mr. Michael Hancock who was an expatriate consultant and a senior lecturer of the Department of Building Economics explained the historical development of the Quantity Surveying profession and its relevancy to Sri Lanka. Professional services offered by qualified Quantity Surveyors in the construction Industry was the topic of Mr. T. P. Miskin, a former senior lecturer of the Department and the Managing Director of a leading Quantity Surveying firm in Sri Lanka namely Miskin & Partners Co Ltd. Professor D. C. H Senarath, Dean of the Faculty of Engineering, University of Moratuwa spoke about the other services that can be provided by Quantity Surveyors which are not presently utilised in Sri Lanka such as life cycle costing and maintenance engineering. Finally Dr. M. E Joachim, State secretary of Construction and Building Materials presented his views on the importance of the Quantity Surveyors in the Public Sector and their future.

Mr, Srinath Perera, third year Quantity Surveying undergraduate proposed the vote of thanks. The first copy of the QUANTITY SURVEYOR '90 megazine was then presented to the chief guest. This became the first event organised by the undergraduates of the Department of Building Economics.

Energy Conservation In Buildings

by

Mr. K. S. Premachandra
B.sc (QS) Hons.

Energy is an essential requirement for a building for the services it provides to the daily life of the occupants. It is the backbone of of the services sector of the buildings. But in most industrial and commercial buildings, energy is not managed, it is only purchased and used. We consume Rs. 12,000 million worth of petrolium and Rs. 6,000 million worth of electricity each year. Out of this Rs 18,000 million, approximately 25% (Rs. 4,500 million) is for the buildings. Therefore it is naturally becomes a national need to conserve energy in buildings. If we properly managed energy we can save at least about 10% of the, cost. (approximately Rs 450 millon per year)

Energy conservation measures can be applied for building mainly in two stages; that is;

(a) For buildings in desing stage
(b) For existing buildings

When considering building in design stage, designer has a responsibility to ensure a balance ratio of energy consumption in building by providing appropriate designs. He is responsible for 25% of the national energy consumption. Therefore he must consider the energy cost implication on the design variables of the building. Those can be briefly summarized as follows;

(a) Building configuration and orientation
(b) Shape of the building
(c) Site influance

(d) Height of the building
(e) Floor - to - floor height
(f) Number of storeys
(g) Roof type, shape etc.
(h) Wind and location of openings
(i) Volume of building
(j) Grouping of buiidings
(k) Colour of the surface

Energy requirements for lighting, air - conditioning and ventilation vary with the above factors. Therefore designer must carefully study the situation and must ensure a balanced ratio of energy consumption.

Energy cost is an important part of the running cost of a building. Therefore it is also important to consider energy conservation methodologies applicable to the existing buildings. In the past little attention was usually given to conserving energy used in existing buildings due to relative low fuel cost. Sharply rising fule prices and concerns of shortage have changed the situation. Cost for energy used in building operation have become such a significant expense that it is necessary that they be kept to a minimum level. This requires a thorough analysis of energy use and conservation in buildings.

Energy saving measures in an existing building can be grouped in to two categories.

(1) Simple low cost methods applicable to existing buildings.

(a) Increase in room temperature
(b) Application of insulations
(c) Installation of double glazing
(d) Adjustment for optimum lighting level
(e) Positioning control switches close to the entrance
(f) Educating people to conserve energy

(2) More complex and costly measures

(a) Matching thermal response with controls
(b) Reducing in flow to minimum ventilation reqirements
(c) Introducing more efficient energy distribution systems

(d) Maintain all equipment at optimum efficiency

(e) Monitor and analyse performance in energy consumption, and

(f) To educate and train staff and other building occupants in conservative energy use.

An energy audit is normally an essential prerequisite to any energy management programme; the audit being used to establish an information base prior to introducing a management programme.

For the economic justification of various energy conservation measures financial evaluation techniques such as pay back period method Net Present Value and Internal Rate of Return methods etc. are used

The results of the investigation done on main building of University of Moratuwa demonstrate the importance of the following factors.

(a) Maintenance of eqiupment in good order

(b) Labelling of light switches

(c) Applying appropriate colour on surfaces

(d) Installation appropriate air – cocditioning systems

(e) Insulation of surfaces in air - conditioned areas

(f) Educating building users towards the energy conservation

(g) Energy management programmes

It is understood that the energy conservation is a national need. Therefore preventive actions should be taken to conserve energy used in buildings. It is clear that the importance of having a energy conserving and management process of a building from the design stage to demolition stage. Building consultants must have a good idea about the annual energy cost of a building in the design stage as well as the throughout of the usage of building.

In Sri Lanka utilisation of energy management techniques to conserve energy used in buildings, is not in a developed stage. This should be developed to conserve energy and inturn foreign exchange. (for example the results of the case study done on the lending library in University of Moratuwa shows that approximately 40% of energy cost can be saved by double glazing and introducing auto - closing doors to the air – conditioned space.)

In air conditioned buildings it is important to minimise the heat transmission through floors, walls and ceilings. Thermal insulations, cavity walls, double glazing, curtains, cavity floors, carpets, roof insulators etc. are used to control the thermal transmission.

According to the records of Ceylon Electricity Board (CEB) considerable amount of electricity is consumed by the domestic household and by commercial and industrial consumers for the purpose of lighting the building. In such a situation it is depressing to see so much electrical energy is also being utilised even for lighting during the day, when there is so much sun shine. Therefore it is important to consider the ways and means of conserving energy relating to lighting of buildings.

A lack of awareness of facts concerning light and lighting, appeared to be the principal cause for the inefficient utilisation o energy. Therefore consideration should be given to effect of colour of the lamp (wheather cool, intermediate or warm), colour of the surfaces, usage of natural lighting, effect of efficient interior layout designs, glazing area and type of glasses, type of lamps (incandescent lamps or discharge lamps), designing of light fittings and efficient lighting systems (general lighting, localged lighting or local and general lighting) etc. Other than above it is required to here periodical maintenance of equipments.

It is important to see how the energy management relates to the conservation of energy. It is a part of asset management. The object of the good energy management in buildings is to provide maximum benefit to the people who use the buildings in return for the minimum energy consumption and cost; yet in many building energy s being wasted through inefficient design and installation, lack of proper commissioning and unskilled operations.

Basic principles of energy management can be pointed out as follows;

(a) Reduce heat transfer to the minimum practicable level
(b) Match heating and cooling loads on environmental systems as closely as possible to the duties or tasks required
(c) Ensure that the operating period of systems and equipment are set correctly

There are three common reasona for energy wastage which can be observed in most public buildings in Sri Lanka. They are;

(a) Inadequate design for energy conservation

(b) Not having proper maintenance

(c) Due to ignorant behaviours of personnel, use the building

Thus it is essential to ensure that preventive actions are taken as they will help the building owner to minimise the annual fuel charges. The government must induce people towards energy conservation by implimenting legislations etc and thereby government can curtail the amount of imports of energy sources such as crude oil etc. Also the governmeut and other relavent institutions can take initiative steps to create an awareness on energy conservation among public through mass media and cinemas etc. and thereby saving in cost.

Preliminary Estimating On Emphasis Single Price Rate Methods

By

Janaka Yasantha Ruwanpura & L. D. I. P. Seneviratne
Final Year B. Sc (QS) Undergraduates

It is essential throughout the entire design process that Quantity Surveyor has the innovative skills to evaluate the scheme he is about to embark upon as accurately as possible, with the available information. These skills and techniques falls into several categeories of which the pre-contract inception stage/feasibility stage being called preliminary estimates prepared by the Quantity Surveyor is actually a preview of the possible tender sum.

The main reasons for preparing a prelimrinary cost advice are as follows;

(1) the problem with the producing of an estimate for a client is the conflict between the cost and the accuaracy. The clients require a price as quickly as possible for future work and most often he requires it to be perfectly accurate even that the information may be scanty, to aware for probabale financial commitment to avoid the waste of expensive resources.

(2) To inform the Architect/Client whether the project is feasible.

Providing an early cost estimate is not a difficult task for an experienced Quantity Surveyor. Though its accuracy will depend on the information provided and the time frame set up for him to give the estimate, The lack of imformation puts him at a position where

he has to depend on his skill and expertise on the accuracy of the estimate. In such circumstances the Quantity Surveyor must emphasis the fact that an estimate based on inadequate information cannot be precise. Giving a cost range, rather than 'giving a precise sum is advisable in such cases.

Early cost advice which is the probable future cost of the project, plays an important role because clients will decide whether it is whithin the financial capabilities of themselves. Thay will also decide whether to go ahead with the project or not (feasibility) based on this important information. This advice is also very important because it will be the amount registered in the clients mind if he decides to go ahead with the project. This does not mean that it should be an over estmate which may cause the client to think otherwise. A preliminary estimate will give a fairly good early cost estimate with plus or mines 2-5% error level, depending the information, skill, experience of the Quantity Surveyor.

Over the years the Quantity Surveyors have developed certain methods to do early cost anvice to clients. Generally the selection of the method is based on the level of infomation provided, amount and form of cost data available. of the project. The methods are;

(i) Single Price Rate Methods (Interpolation Methods)

(a) Unit Method
(b) Cube Method
(c) Square or Superficial Method
(d) Storey Enclosure Method

(il) Financial Method
(iii) Cost Modelling

In this paper only the single price rate methods are taken into consideration

General Factors to be Considered in Preiminary Estimating

As explained earllier too, the preliminary estimates are generally prepared on the basis of scant informtion, on the particular project concerned are also the available of suitable cost information Estimating or forecasting of a future project consist of two processes, measurement

and pricing. It can be reasonably argued that the easier the method of measuring, the more difficult it will be to arrive at a relliable and accurate price.

The Quantity Surveyor needs to get the suitable quantitable data from the clients informarion avaiiable information may consist of nothing. More than building types, size and no. of storeys. Details about the specification level to be applied and the quality and the quantity of service and fittings and often only be determined from slmilar previous projects, or the Quantity Surveyor's own knowledge and expertise. The cost informationsavailable to Quantity Surveyor are; Priced Bill of Quantities, Price Books, Estimating Data, Cost Analysis, Building Cost Information Services, Cost Models and Computer based applications, Material and wage invoices. The Quantity Surveyor when providing an preliminary estimete/cost advice has to predict not the "going" price for the project but the price which the contractor is prepared to carryout the work. In making this predicton the Quantity Surveyor will objectively view past recorded date for similar work and will update and award some factors for variations.

Factor are:

1. Market conditions: The Quantity Surveyor in order to predict the price at the preliminary stage as possible to the tender sum, must be able to interprete the trends in prices based upon the past data and current circumstances. This however demands a great deal of skill and some measure of luck. Allowances must also be made for changes in contra ctual conditions (If known), type of client/the general state of the industry & the availability of resources.

2. Desing Economics: When using precious cost or cost analyses, changes in costs for desing variables such as shape height, size. etc will need to be taken.

3. Quality factors: Construction information deemed to be based upon the assumed of defined standards of quatity. Where the quality of the proposed project is considerd to be different from the available data such as finishes, fittings etc. One certain change may have to be done because quality indication for any cost advice is essential.

4. Engineering Services: The costs tor these are becoming very expensive. When the schemes get larger and complicated a special attention should be made.

5. External works : Due to the considerable differences which often exist between building sites, little cost relationship between the element of buildings. The site, nature of the site, the nature and the scope of the work to be carried uot will be important factors to consider.

In general the time period allowed to prepare an early cost estimate is fairly short and the acceptable method should give a very quick response with the minimum available data. As the time pass by the interest for an early cost advice fades away and the clienf needs much more detailed and precise estimates.

However the most suitable preliminary cost estimation method should have the following features.

(1) It should be a very sensitive technique.
(2) In the early stages it shoud be able to give fsst results.
(3) As the design develops the method should be able to absorb design detnils and specification information without remeasu-remeni of the total job.
(4) The method should be easily used and should give fast results.

Unit Method

Generally when a client seeks the services of a Quantity Surveyor with a spscific project in mind he will speak out the intended purpose of the building (Functional usə) and the size (Number of persons or units of accommodation) and quality of the project. As there are no drawings at all, the Quantity Surveyor have de veloped a method called the "UNIT METHOD" in order to give a preliminary cost estimate for the clients This method has been developed taking into consideration the fact that "The cost of the project has a very close relationship to the number of functional units accommodated in it."

This method is very useful for the projects like hospitals, schools, car parks. The cost is obtained from a careful analysis of the recently completed buildings of the similar nature. However it is necessary to make adjustments for the factors of the proposed project.

Cube Method

The cube method is also a singie price rate method based upon the cost per cubic metre of the building. The contractors/Quantity Surveyors kept what was called a 'CUBE BOOK', in which they would record the cost of a project that they had undertaken and express that the cost as a per cubic metre.

The cubic content of the building is obtained by the use of rules prescibed by the Royal Institute of British Architects. The methed of determining the cubic content is depend on the type of roof and whether the roof space is occupied. The assessment of the price per cubic metre of a building calls for the exercise of careful judgement coupled with an extensive knowledge of current prices and trends.

Square or Superficial Method

This is again a single price rate method based on costs pe square metre of Gross Floor Area. This is a popular method of preliminary estimating, as it is comparatively east to calculate the floor area expressed in a way which is fairly readily understood by most people (building client, Architect or even a layman). Furthermore, mos published cost date is expressed in this form.

Here too, the cost is adjusted according to the varying construction and finishes, different standards of accommodation, and in such a case, it is more generous to separate the floor area to suit them.

Storey Enclosure Method

Basically fhe aim of this method is to obtain a total superfica l floor area (total storey enclosure area) is square metres to which a single price rate can be given and effect of the various rules that have been outlined is to apply a weighted cost factor to each of the main parts of thc building.

Conclusion

In preparing a preliminary estimate the Quantity Surveyor has so many technibues as discussed earlier. However most of them suffer some deficiencies in measurement and pricing in order to predict a futute cost. When considering commonly the following are the problems that could be seen in every system.

1. Lack of the available informatlon and the past records as described.
2. Difficulty in making allwances for the factors like market condition, desing factors and the like stated earlier for the proposed work when referring the past records.

As stated earlier Qunatity Surveyor's role is much more important to the construction industry because of the innovative skills and techniques he adopt to forecast the cost. However the Quantity Surveyor may makes a mistake when forecasting a future cost according to these methods. Therefore these preliminary estimating methods must be carried out as accurately as possible since the first figure that the client hears is the one that he will always remember nothwithstanding any caveats and qualifacations. Especially a conutry like Sri-Lanka needs these systems constantly due to the large no of construction work undertaken by the public sector for public accountabiiity but unfortunately it is less likely that these systems utilise in the present day to prepare the preliminary estimates.

In order to achreve the results better the measurement and the pricing technigues used today should improve to facilitate the requirements which are in demand. Here are the couple to suggestions;

1. Enhance and motivate the quality of the cost information available to a Quantity Surveyor and develop new systems to use, based on the past records.
2. Improve the quality and the types of Preliminary design date supplied by the Architect/Client to the Quantity Surveyor.
3. Consider better ways to reach the tender sum at the preliminary stages through the reaserch programs.

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Finding a framework for the future

If the QS profession is to develop successfully and assert its position in the marketplace, a framework for that development must be decided upon. In this article Noel McDonagh and Peter Brandon open the debate.

According to the old advertisement if you want to get ahead get a hat. The issue for quantity surveying is what hat should it be wearing in order to get ahead in the services it provides for its clients over the next generation.

The future presents a considerable challenge to the profession. Information technology will relegate many skills undertaken by professional QSs to the technician level. A Europe under-populated with Quantity surveyors will be sceptical about changing its time honoured processes to encompass QS techniques-even if it thinks they make good sense. The boundaries between the professions in the industry (and elsewhere) will blur, fudge and eventually disappear. Construction clients will be better informed through better communication and will demand a better ervice, at least equal if not better to that found among our overseas competitors. The trade gap on services may follow the already observable trade gap on materials and components in the industry. This may occur whatever QSs might do, because our overseas competitors do not have our fragmentation of professions and industry. They can often act corporately across the design/management spectrum and avoid the confrontational mode of UK systems. We shoud not repeat the mistakes of the past. We must not compare ourseives with ourselves but look further, beyond this island, to what is happening overseas and then decide to be ahead wherever possible.

To do this we need to structure our thinking, create a debate and invest in our future. We need a framework within which practice, education, research and marketing can take place.

This is not a trivial exercise. It requires imagination, a re-examination of the nature of our profession and a robust classification of our knowledge and skills which will stand the test of time.

To start the debate rolling we offer the following as a starting point.

A profession can be defined as a group of people, with deep knowledge applied in a specific area, bound by a code of ethics which has the public trust. The key words in this definition in terms of future development are knowledge and applied. To apply the knowledge the members of a profession need skill. Therefore it is this combination of knowledge and skill applied within a certain domain which is its very essence (see figure 1 below).

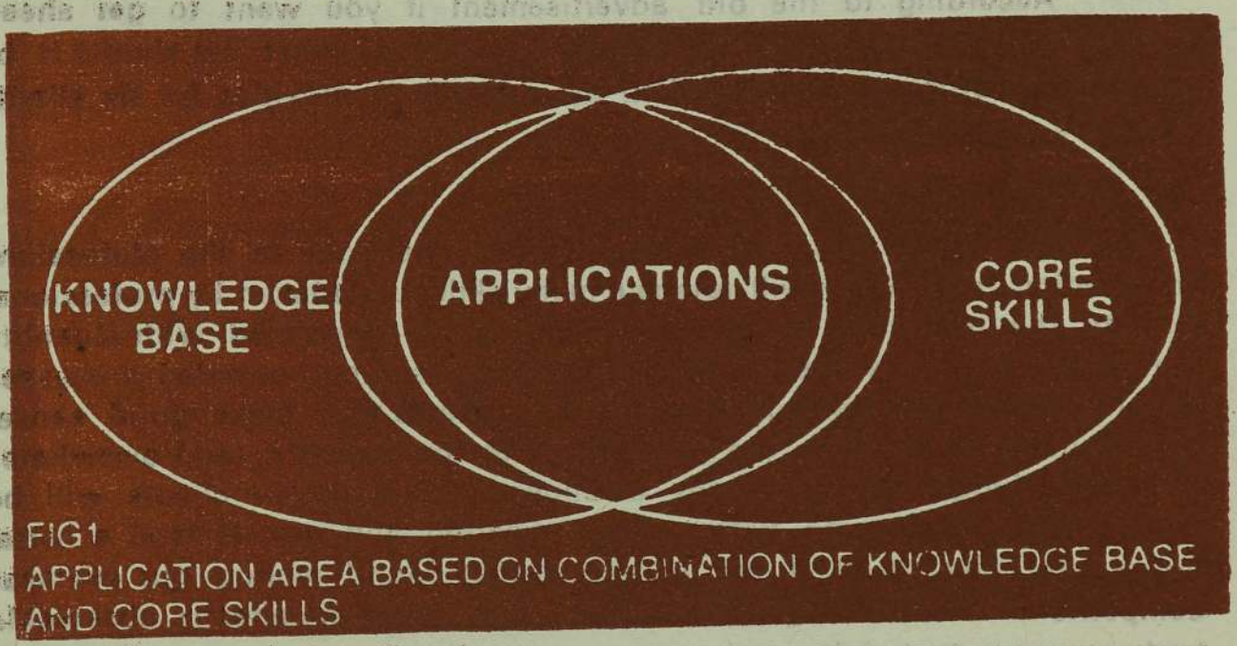

FIG1
APPLICATION AREA BASED ON COMBINATION OF KNOWLEDGE BASE AND CORE SKILLS

The application area can be extended or contracted depending on market forces, competition and marketing policy. None of the three components are static and all need constant surveillance, updating and modification. In terms of quantity surveying at the present time the knowledge base could include;

- Construction technology;
- Construction economics;
- Information systems;
- Contract law;
- Economics,
- Project management;
- Measurement;
- Marketing; and
- Business administration.

Its core skills could include :

- Management;
- Appraisal/evaluation;
- Value management;
- Analysis/synthesis;
- Measurement;
- Communication; and
- Computation.

Not all of this knowledge or skill base is available to every QS but as a profession we can encompass them. To extend the scope of the professino it is neceesary to focus on areas whico can be easily communicated, are reasonably robust and discreet and which allow a framework for education, research and development, practice strategies and marketing to proceed, This framework will need to recognise the changing environment and will have to accommodate the developments in technology which are rapidly transforming our world. All professions are facing this problem. Most recognise that it is management and design which offer the least assaitable high ground for the medium term future.

Since design is a very specialist skill/knowledge/art it would not be wise for QSs to go down this path except for peripheral activity or possibly where they form part of a multi-disciplinary team. Management is therefore the forte and focus from which quantity surveying can market and develop its services what type of management is the next question.

It is possible to leave this question open but that could lead to dilution, dissipation and eventually the loss of corporate identity. It is equally possible to retreat to the roles of the past but this would not provide the vision required for the future. We need to work together towards common objectives, towards common goals, towards a corporate consensus that can be reflected in education, practice and research.

So what focal points for management can quantity surveying use to ensure its future?

The authors propose four key areas which will provide a focus for strategic development; provide a structure for education, provide a clearly identifiable note for marketing its services and build on its existing knowledge and skill base. The four areas are as follows;

Value management

In value managemement the QS has the opportunity to define his role in a positive way and bury the negative cost cutter image of the past. Value involves a balancing of resources with benefits. It can be argued that the resource aspects are already covered by the profession and that we now need to address the benefits side. This will involve qualitative as well as quantitativ assessment and it may mean a more sympathetic treatment of design and the environment.

The key areas of cost/resource will include:

- Cost management:
- Cost planning and control:
- Time manangement:
- Cost/time/quality/function analysis and appraisal;
- Life cycle costing; and
- Cost modeling

The benefit side will include:

- Development appraisal;
- Enviromental anaysis;
- Energy auditing;
- Design appraisal; and
- Welfare.

All could be encompassed within framework of value management which may be different to that normally associated with the term in the USA and elsewhere.

Procurement management

Quantity surveying is will established in the process of procuring buildings. There seems very little to stop the profession exercising this skilled function in other areas involving large assets. The principles are often the same and the application can be learnt quickly. Under this aspect of management would be:

- Procurement path selection;
- Tender documentation and management;
- Project management;
- Construction management;
- Risk management;
- Financial, investment and taxation management; and
- Building economics.

The latter part of the list will need addressing by most QSs in terms of continuing education if we are to perform a credible role. Eventually these topics will be a key part of the education and qualification process.

Built asset management

If we are to provide a one stop management process from inception to demolition then management of the built asset cannot be ingnored. Some firms are already well established in the field and it appears to be a growth area for other divisions of the RICS and other professions. The eastablishment of a continuum of management advice from inception through to demolition (including refurb shment) is a desirable characteristic of an improved service to clients. Under this heading we would expect to see:

- Facilities management;
- Property portfolio management;
- Estate management;
- Property date management; end
- Management of refurbishment.

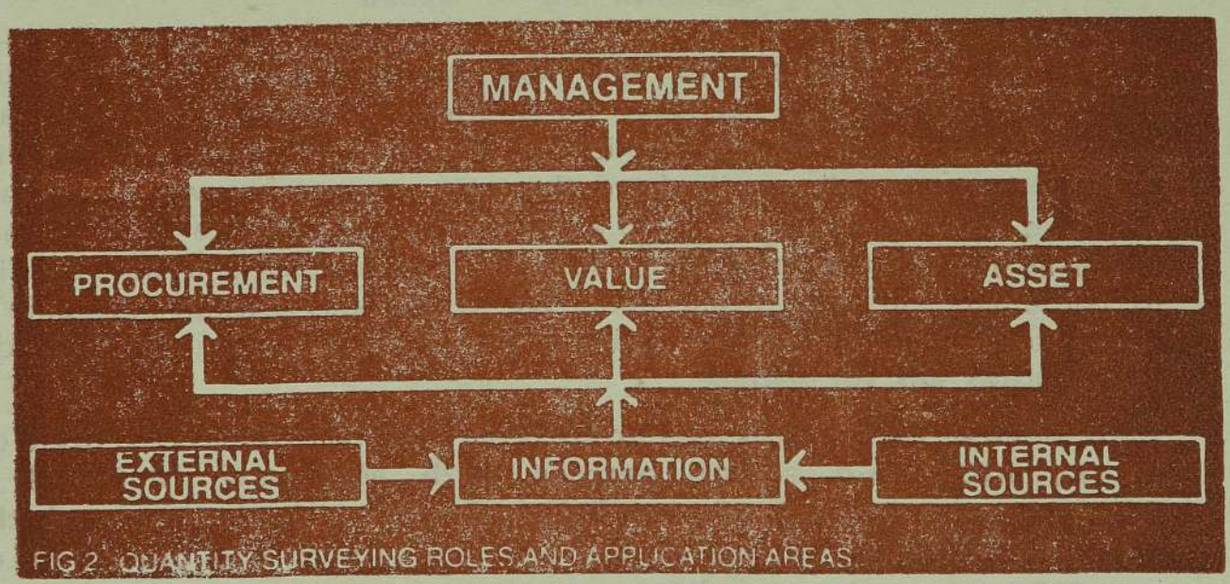

FIG 2 QUANTITY SURVEYING ROLES AND APPLICATION AREAS

Information management

Underlying all the above must be the control of design, construction and property data. It forms the intelligence upon which management decisions can be made. QSs are perhaps best suited of all the construction professions to manage data, knowledge and information. Their traditional role has been to receive, analyse, manipulate, store and retrieve vast quantities of project information. As time goes on the role of information and information managemet will develop and become more important in the construction context. QSs should lead, maintain and develop the new generation of information engineering.

Under this heading the surveyor will need to address:

- Integrated systems and
- Systems management;
- Communication;
- Automantion and robotics and;
- Intellingent systems; databasses;
- Computer aided design/construct;
- Information management

Conclusion

A reformulation of the framework of quantity surveying will have repercussions beyond the Qs profession itself. It will involve discussions within the RICS on the overlap and collaboration with other divisions. These boundaries together with those relating to other professions will begin to disappear as we begin to develop a service elated to client needs rather than professional traditons. A robust theoretical knowledge base to support the suggested framework will need to be developed and this will take time to establish

The authors believe that the future framework for quantity surveying development needs to be addressed now and that we have a 10 year window of opportunity to get things right. We do not believe that we necessarily have the right answer but we do believe we have introduced the basis for a debate. We would like to encourage all members of the profession, colleges, universities and polytechnics to participate in the discussion. We will then attempt to gain a definitive framework for the future of the quantity surveying profession.

Noel McDonagh is currently president of the QS division of the RICS and senior partner with Mulchahy McDongh & Partners in Dublin. Professor Peter Brandon is chairman of the department of Surveying at Salford University and chairman of the RICS research committee.

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Government Policy Changes Relating To The Construction Industry In Sri Lanka. 1948 - 1956

by

N. Niranjanan B. Sc (Q. s) Hons

(An extract of the Dissertation Submitted to the Department of Building Economics for the degree Course B. Sc. (Qs.)

Introduction :

The dictionary meaning for the word 'Policy' is "a course of action or a system of administration guided more by interest than by principle" (Chambers, new edition 1983, p 993). So, the term "Government Policy" can be defined as "a system of administration by the government guided more by the interests of the government or the nation than by the principle". In this context, it can be said that what has been achieved must have been the out come of the implimentation of the policies of the governments in the past.

The performance of any industry is closely related to the set of policies laid down by the government in relation to that industry. These policies may be reflected through direct participation by government in that industry or through a set of regulatory mechanisms and control policies in the absence of direct participation. Governmant policies which are relevant to the construction industry can be grouped under three headings, namely; monitory policy, fiscal policy and others.

In the case of the construction industry in Sri Lanka, it basically comprises client or the employer, contractor and the consultants. Among these three parties the client has to be given more consideration as he creates the demand for construction and finances the project. Any factor which affects the client will have a great impact on the progress of the indstry. The factors which affects the client's such decissions are the general and political situations which prevail in ths country, clients financial conditions, income distribution of the population anp the government policies and legislations which are being implimented in the country during and period which is under consideration.

But if these factors are analised with due consideration it can be found that the factors are also linked with each other. For example living standards of the population will reflect on the country's economic situation and the government policies and legislation which prevail will reflect the country's economic, political and social pattern

The government may influence the industry as a client. Government of Sri Lanka undertakes various building and civil engineering projects. The decission to such undertaking will depend on the general economic, political and social conditions which prevail in the country from time to time. In other words the above mentioned factors will determine the need for construction.

The government as it is the supreme administrative body of the country may enforce certain regulatory and control policies towards construction. These can be either monitory or fiscal policies.

These policies had made their impaet on the construction industry in various forms. Thess policies as mentioned earlier in the introduction of this report, can be grouped into three cntogories.

a. Government's direct involvement in the construction as a client.
b. Monitory policy implications; and
c. Flscal policy implimentations.

Dircet Involvement In Construction :

The government had undertaken the responsiblity of providing better living conditions to it's citizens by providing electricity, housing, water supply, better roads and other infra-structure facilities and also

the proper conditions for the agriculture development. In order to achieve these objectives the government had to construct dams, irrigation schemes, reads, bridges etc. Hence the construction industry was used by the government as a mean of achieving these objectives, the government playing the role of client to the industry.

In the case of the construction of the Gal Oya project, the government wanted electricity generation, flood protection, irrigation etc. from this project. This is the objective of this scheme. To achieve this objective the government initiated the construction of this multip-urpose project. The Gal Oya Development Board was formed to administer the scheme. This board had formulated programmes and implimented them to achieve the needs of the government. The benifits which the construction industry derived out of this project were the transfer of echnology, training of labour force in construction activities etc.

Projects like the gal oya development project, harbour development project, etc. were the maior projects and were constructed by the foreing contractors. This indicates that the Sri Lankan contracting industry was not in a position to undertake such major works. The collected informations shows that the engineering and technical staff available were not sufficient to meet even the government's demand. This situation and the lack of experience of Sri Lankan engineers may have contributed to the non-existance of a strong local congtruction industry. The direct involvement of the local engineers and other operatives in the design and construction of the schemes like Gal Oya, enriched the Sri Lankan engineers knowledge in high tech construction activities and also increased the skills of the local labourers although there is no record to state that this was achieved through a definite government policy.

Housing was also another form of direct involvement in construction activities by the government. The construction was executed through the Local Authorities, Public Works Department, etc. These houses were built for the government servants and also for the general public.

Monitory and Fiscal Policies :

The monitory and fisoal policy decissions were implimented by the government to encourage the private investors to invest their money into capital investments. This meant an increased level of construction activities in the nation.

The Benifits to the Industry: The increased level of construction activities in the country meant that the construction industry was in a fairly stable position. Particular of this nature increases the demand for material, labour, plant, and equipment; capital formation in the construction industry increase; the construction industry's contribution to the National Income increases. If there is a stedy demand for construction then the engineers, technical staff, and other employees will gain their experience and hence the ability to handle construstion project will increase.

Such action or the policy decissions must also be analysed in the light of he following conditions to assertain the effects that the above mentioned action or policies of the government had made towards the construction industry.

Project Based Policies :

The government's action or policy decissions which were discussed in the previous chapters were not in their real sence, policies which were implimented to improve the construction industry. These policies were implimented by the governmegt to achieve some other objectives for which the construction industry was used as a tool. Hence the policies which were implimented from time to time were to facilitate the government to achieve their needs.

Though the technological development or rather the transfer of technology which resulted from the projects like Gal Oya Development Scheme, there is no clear indication that these were the objectives of the government. The government's only concern appeared to revolve around the completion of the project and to achieve the objectives which the government expected out of it.

Technological Development :

Work force was trained to meet the demand of the government in it's development projects and in the governmental institutions like the Pubiic Works Department. The students who were trained from the technical colleges were absorbed by the public sector institutions. The development of the private construction agencies did not appear to have attracted the government's attention.

Therefore we can come to the conclusion that the government or the policy making bodies have failed to recognise construction industry as a major contributor to the Gross Dnmestic Product of the country and that it has an important role to play in the national development.

From this analysis some suggestions can be made to improve the efficiency of the construction industry. But as this report covers only the first eight years of development after independance and also as there had been a number of changes that occured in the later years. One has to do a further research of the remaining period to find out whether these suggestions continued to remain un-attended by the governments that followed.

The suggestions are as follows;

a. The government has to take steps to improve the construction industry's capacity and capability to undertake the maintenance of the existing facilities and to provide new facilities. Bringing foreign contractors will be very expensive and therefore it will be a grate burden to a poor country like Sri Lanka.

b. The government can form a department or a statutory body to regulate the construction activity in the country. This department can look into the problems that the industry faces and ensure that there is a continuous demand for the construction sector. This will encourage an indreased number of personnel to take part in the development of the industry by setting up constructing, consulting and building material manufacturing enterprises. Invesment in sush ventures needs an input of a considerably high amount of resources and as this industry is not stable industry the risk being very high. So, the government must take action to stabilise and regulate the activities in the Industry.

C. The gavernment must make sure that it does not implimen policics which conflict with the interest of developing the construction inbustry. The classic example for such a policy was the implimentation of the rent restriction ordinance, which discouraged the investing housing of a certain type.

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Construction Cost Control "Asystems and Contingency Approach"

by

P. E. O. ORUKO

B. Sc (QS), MSc (BEM) LON.
Senior Lecturer
Department of Building Economics

Abstract

successful cost controls of construction projects have been elusive despite the numerous cost control models available for use in the industry. One possible reason may be the uniqueness of the construction industry interms of variability in size of projects, job conditions,type of contract and view points of the parties to the contract which make it unrealistic to prescribe solutions to problems to cost control.

This paper sugests that the solution lies in considering the construction industry as a dynamic open system and applying the analytical frame work of linking the environment of construction industry with the internal componets of cost control systems and by applying the contingency approach, we can investigate in order to understand the relationship between the interanal componets of the system which define the project which define the project environment and consequently help us to determine the suitable cost control system for vaious types of projects.

Key words Systems, Contingency, Environment, cost, control. The construction industry to varying degrees has always used cost control However, with project size steadily increasing, the need for cost control tha vastly expanded and reached almost critical importance.

Just a couple of d decades age not many projects existed costing millions of rpees. Today projects costing milions are commcn place and greater attention is now been given to projects cost in billions clients are thus keenly interested in obtaining good-value for money from their investments;this is drawn from numbe: of issues. For example, the margin between a viable and nou-viable investment has beocme narrover previous experiances with the industry especially in the area of cost control have been dissappointing and bodies representig corporate clients and consumer bodies have increasingly challenged the methods by which project cost are controlled (BPF, 1983).

A common theme of the client driven debate is the need fo recognization of the construction practices and professional relationships. The net effect for the professional practices of these client-initiated pressures has been that clients are now seeking a far grater urgency for the completion of projects and few employers have the time to allow for the re-designg of schemes consequent upon the receipt of excessively high tenders. Secondly employing organizations have tended to become larger and are themselves adopting more sophisticated techniques for the forecasting and control of expenditure. and they in turn expect a high level of effeciency and expertise from their professional advisers. It is therefore vital that an effective cost control procedure should be sperated during the design stage of a project in order to keep its total cost within the employer's budget, frequently based on an approximate estimate of cost prepared in the early stages of the design process.

Genarally speaking the constructiong contracting is of beespok nature. Much more frequent is the coming together of the variaus professional bodies with the contractor to form a temporary organization for the purpose of produing a building for client. Every client, professional body and contractor connected with a project is therefore either directly responsible for cost or through his efforts indrrectly assists in its control. Why then has successful cost control been elusive? Why can't a consultant not learn cost control techniques and procedures on one project and then become immune to cost failure on feture projects? The answer is that all projects vary so widely in size, job conditions, type of construction, organization and viewpoints of client, consultant and contractor that it is impractical to apply uniforml cost control measures Also cost must be regulated in all project phases which further militates against prescriptive procedural solutions What then is to be done?

One possible solution may lie in the general system theory and here I will attempt a brief analysis of th's key area of management by what is known by management theorists as the systems and

contingency apprach. Systems, according to Bertalanffy are defined as "an organised unitary whole composed of two or more interdependent parts, components or sub-systems and delineated by identifiable boundaries from its envionmental suprasystem"

Systems theory provides a broad analitical framework for understanding any organization. It is used as a tool for unraveling complexity. The point here is to consider the construction industy as an open system and the project as a temporary organization which receives inputs, transforms then and exports the outputs to the environment.

The inputs include people, capital and managerial skills as well as technical knowledge and skills. It is thus the task of managers in this case the project team to tranform the inputs into outputs in an effective efficient manner.

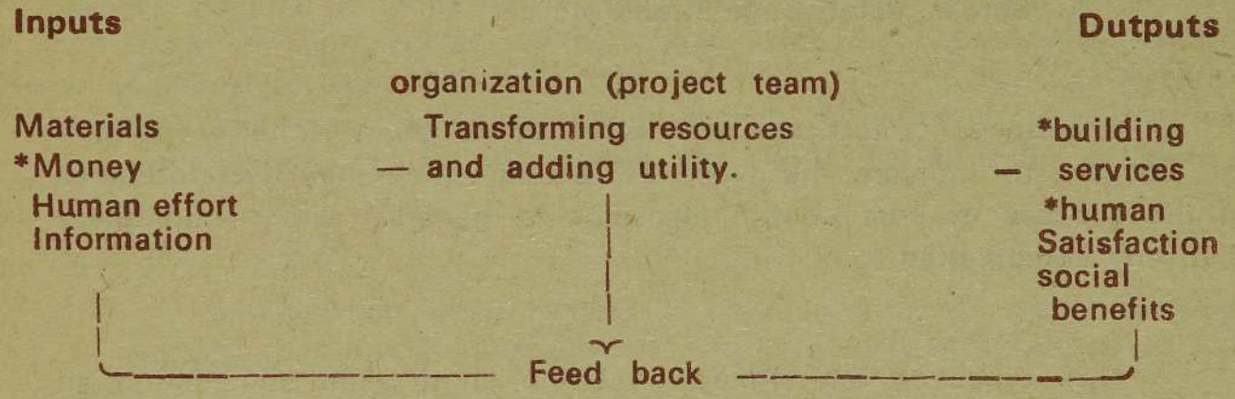

Figure 1

To speak of organisation is thus to speak of environment as well. The inevitability of needing to secure inputs, to disburse outputs and of attempts to regulate inextricably links the members of any focal organization with the members of its environment in a form of 'Love-hate' relationship. 'Love' because of the opportunities the enviroment provides and 'hate' decause of the 'inextricably linbed' because of an inai lity for anyone to have the opportunities without the possibilty of constraints. Figure 2 provides an illustration of the conceptualization of the links between the sub-system Cost Control and its enviroument in terms of constraints and opportunites.

The five sub-systems shown interact with each other and the environmental suprasystem. In considering the subject we can identify factors of the four sub-systems as internal elements there are the

political, economic, legal and technological subsystems. Typical of the factors which may be included in each of the four external sub systems are:-

Political : Government expenditure in construction, import and export regulations; planning laws, Government policies on construction.

Economic: Interest rules, inflation rules, tax benefits, Government economic policies, land values and opportunity costs.

Technological : Level of prefabrication and mechanization, standarisation of processes etc.

Legal : Employment law, contract law, arbitration, cost of legal redress, safety regulations etc.

The above factors are not intended to be a finite or definite list, but are to indicate the types of factors which may bear influence on the success of cost control measures in general; either individualy or in any combination.

One aspect which should be borne mind when considsring an adoptive organization such as the Construction Industry is the potential chaos that may result from any decisions made therefore there exists the need to evaluate uncertainity, risk and cerainity. i. e. whether decesions made are implemented in the knowledge that there is good, reasonable or completely unknown chance of success as result of that decesion or of interferance from other sources.

Having established the external areas which may affetc our subject matter, we are in aposition to look at the sub-system with which we are concern. However, before doing so let us briefly consider the contigency approach to be applied. The idea here is to ionvestigate and understand the relationships between the subsystems themselvas and between them ane their environmental suprasystem. So that we may intervene at some point in the system and consider variations in the configurations that may allow us the make choices or prescribe solutions.

Cost Control has two essential characteristics : they are done in advance of actions to which they apply and they are developed consciously and purposefully. What then are their intern components and how are they related to each other? In answer to this we are to identify these factors which define the project evironemnt and determ ne its cost control system.

Type of project size and complexity project phases
Type of procument system
Type of construction organization
Viewpoint of the parties to the contract.

Figure 3 provides an illustration of the contingent factors affection our Cost Control sub-system.

A fairly complex system has now evolved. This is to be expected as we develop a more detail analysis of the system and indeed begin to show the deficiencies of the current methods of cost control systems. It is therefore necessary not only to understand the basic cost control systems but also the construction project environment so that cost control systems can be developed that will best suit the situation at hand.

Having developed system of cost control, we can now begin to analyse the internal components and how thay are related to each other.

Type of Project, Size and Complexity

Each type of construction projeet has a different element of risk. It is this element of risk that is reflected in the tender price. An efficient basis for risk allocation essentially means that contractual and construction risks should be allocated in such away that each risk falls to be borne by the party who, is in the best position to deal with it. For instance if we accept that the contractor is more konwledgeable on construction details, then the risks attached to the preparation of these details should fall on the contractor. Similarly if the client's engineer is in better position in a particular project to plan a head and undertake detailed soil investigations then it seems sensible that risks for unforseen ground conditions should not fall on the contractor. Such an approach should serve everyone in the conrisk premiums which necessarily attach to any construction undertaking.

"To built bigger is not necessarily to built either cheaper or better" (Schumacher, 1973). The apparant initial economy of scale can be more than offset by the many additional problems that sheer size brings with it for example organizational complexity, difficulties in main trainings steady operating conditions longer construction period etc. The solution therefore lies in building small - "seall is beautiful". Big and compllex projects means more design constraints, more partıes to be consulted and more cost items to control.

Type of Procument System

The type of procument system used affects the extent of control required by the contractor and the Employer. Where the scope of work is fuly defined, with desing and working drawings complete before bid invitation, the cost estimate is more accurate is comparatively small and actual costs can be monitored against four critaria, with four stars indicating a good rating thus the degree of control required for different types of procument system with less than four stars

Classification of contracts into different types is useful in helping to identify and compare them. From the above it is apparent that the Lump Sum Tender, based on bills of quantities, provides the most effective method of satisfying the key criteria. The other options may result in improved time economy, but cost reimbursement and management contracts involve greater risks in terms of cost economy, fininancial commitment and post contract cost control. It must be remembered, however that this classification is only for convience, the real situation is never that simple.

Project Phases

Effective cost control of construction project is as important in the design office as it is at the construction site. It is the design that establishes the scope of the work. The effectiveness of cost control efforts is therefore maximum during the preconstruction phase and decreases as the design becomes more defenite and commitments are made during implementation. Figure 5 illustrates the relative effectiveness of the cost control effort required during the three phases of the construction project.

Although the project phases are identifiable by district Cost Control requirements, they are dovetailed because of interdependence of estimating and cost control operations that do not necessaraly occure

in the same phase. Estimating is carried out during the desing phase and cost control is exerciesd during all phases Cost Control systems theretore need to be adoptable to requirments of the project phases. They also need match the organization that they serve.

Type of Construction Organisation

The construction organization here is the temporary organization considered in terms of the relationship beteen the Employer, Consultants and Contractor and between the Consultants themselves. In the traditional arrangement, the client employs Architect/Engineer/Q S. for designing a project. The Architect/Engineer invites bids and recommends to the client the contractor to be awarded contract. The contractor builds and the client and contractor are in adversary roles, one trying to get the best quality at the lesast cost and the other attempting to get away with the least– and ofcourse both are interpriting the same specificat ons The client has the minimal organization to control constiuction cost. In Design and Build Contract, the client needs an engineering organization to evaluate design and supervise construct.on. In both cases he does not need a large organisation for cost control, but this is not so for the contractor who cannot, without strict control stay in business. Each member of a Project team is in a position to affect an thus control cost. But he cannot act in isolation. The best result is achieved when all Involved in the project are working in Pharmony and playing in unison.

Viewpoint of the perties to the contract

Because of different contrct price, the client contractor and Architect/Engineer/Engineer/Q. S. have different types of relationships with repect to project. On any one project, each is responsible for his own ccst. the contractor's view point is to construct within minimum total cost keeping it less than his bid price and try to make as much profit as possible. the client as well expects the project to cost him the minimum, but he is not thinking of the same total cost.

Even when the contractor and the client think of the cash flow, they think differently, although the objective of both is to keep their financing costs to the minimum. The inflow for the contractor is the outflow for the client. The consultants are comparatively indifferent to cost and cash flow on the project. Figure 6 shows the interests of the parties to a constiution project. It typically demonstarates the effect of view point of cost control requirements.

Because the final total has a different meaning for each of the parties, the same is also true with Cost Control, Hence cost control from the standard point of one is not exactly what the other needs.

Conclusion

The theme repeated and demonstrated throughout in this paper is that the type of contract together with all other elements in the construction environment determines the cost control system used any construction project. It has also been suggested that environmental analysis is an important activity for all those concern with cost control. The determination of strategies and tacties in the light of analysis, or their emergence by default, will it is argued, have far-reaching consequences. The work of the "Contingency theorists" leads to one important general practical conclusion. That the greater the degree of variability and change in the environment, the more adoptive and span the organization should be and consequently the more elaborate the means of integration and co-ordination. On the besis of the basis of this guide, professional statute will not be mnaintained if they only ascriba presonptive methods and solutions to what is a dynamic industry.

PROGRAMME

DEPARTMENT OF BUILDING ECONOMICS

"Cost Control In Construction"

B.M.I.C.H. Committee 'B' Room.

24th APRIL 1992

8.40 a.m. — Special invitees take their seats.

8.55 a.m. — Arrival of the Chief Guest Dr. M. E Joachim.
Secretary to the Minister of State for Construction and Building Materials

9.00 a m. — National Anthem and Lighting of the traditional Oil Lamp.

9.05 a m. — Welcome Speech by Mr. Janaka Y. Ruwanpura.
Final year Quantity Surveying undergraduate

9.10 a m. — Address by Mr. R. Srinath Perera.
President of the Association of the Graduates of Department of Building Economics & Assistant, Lecturer of the Department of Building Economics, University of Moratuwa

6.15 a.m. — Address by Mrs. C. Weddikkara. Head, Department of Building Economics, University of Moratuwa.

9.20 a.m. — Address by Professor Lakshman Alwis.
Dean. Faculty of Architecture, University of Moratuwa.

9.25 a.m. — Address by Professor. G. T. F. de Silva.
Vice Chancellor, University of Moratuwa.

9.30 a.m. — Address by Professor A. P. R. Aluvihare.
Chairman, University Grants Commission.

9.35 a.m. — Address by The Chief Guest.

SEMINAR SESSION 1.

9.45 a.m. — Convenor : Mr. P. E. G. Oruko.
Expartriate Consultant, Senior Lecturer Department of Building Economics, University of Moratuwa.
"Introduction : Cost Control in Cunstuction : An Overview"

9.55 a.m. — Professor P. G. K. Fernando,
Department of Building Economics, University of Moratuwa
"Design and Cost advice : Designers Objectives in designing with Cost Control aspect in mind"

10.10 a.m. — Panel Discussion (1)

10.25 a.m. — Mr. H. D. Chandrasena
Chief Quantity Surveyor, State Engineering Corporation of Sri Lanka & Immediate Past - President of the Institute of Quantity Surveyors. Sri Lanka
"Cost Planning of a Construction Project is a Precusor for Good Value For Money"

10.40 a.m. — Panel Discussion (2)

10.55 a.m — Refreshments.

SEMINAR SESSION 2.

11.25 a.m. — Mr. P. Mervyn Gunasekara
Managing Director, LAN Management Development Services & Institute for Computer training and Software Development.
"Cost Modelling and Total Cost Concepts"

11.40 a.m. — Panel Discussion (3)

11.55 a.m. — Mr. C. H. de Tissera
Secretary to the Minister of State for Housing
"Effects of government Policies and Strategies in Overael Cost Control"

12.10 p.m. — Panel Discussion (4)

12.25 p.m. — Mr. W. A. Palmer
Project Manager Balfour Beatty Limited
"Site Cost Control : The Contractors Dilemma"

12,40 p.m. — Panel Descussion (5)

12 55 p.m. — Vote of Thanks Mr. R. A. P. Rohana
Final Year Quantity Surveying undergraduate.

1 00 p m. — End

Panel

- Mr. E. I. Munasinghe
  Director-General Institute for Construction Trainees and Development.
- Dr B. M. A. Balasooriya
  Director, Stems Consultants (PTE) Ltd and President of the Society of the Structural Engineers Sri Lanka.
- Archt Mihindu Keerthiratne
  Chairman, Mihindu Keerthiratne Associates and President of the Sri Lanka Institute of Architects.
- Archt Lalith de Silva
  Chairman, Lalith de Silva Assocites & Immediate Past President, Sri Lanka Institute of Architects
- Mr. E. M. D. de Zylva
  Consultant, Associatation of Construction Contractorse of Sri Lanka
- Mr. Rohan Thudawa
  Manging Director Thudawe Brothers Ltd.
- Mr, G. Gunaratne
  Managing Director Keells Devolopment Ltd.
- Mr. Mohan Kumaraswamy
  Director, Prject Managment Servises Ltd.

Compere — Mr. V. Senaka Daluwatte
Finnal Year Quantcty Surveying Undergraduate

Design and Build Path and Its Suitablity for Sri Lanka

By

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This artical has been adopted from a few selected chapters from the Dissertation submitted by the author as part of the B. Sc (Q.S.) degree course.

Introduction

About 30 years ago the word 'Procurement' was not often used by many in the construction industry. But now the selection of a suitable procurement system for a given project is a major and significant decision expected from the consultants by the clients.

The traditional system has been the most extensively used procurement path in construction. However during recent times new methods of contract procurement have come into existence. It is not wrong to say that changes in procurement paths were probably the most fundamental single change that affected the construction industry during recent times. Of these new developments the change to a design and build (D & B) path is significant since it changed the whole concept of designer – builder separation.

Historical Development of Design And Build Path

How a prospective owner of a building procures a building can be organised in a number or ways. But when it comes ot payment, there are only two fundamental alternatives.

(A) Cost Reimbursement : Here owner pays for ail the resources used, wasted or otherwise. This system infact gives an intentive for wastage. Thus it in not very popular among clients.

(B) Price in advance; Contractor is paid the lump sum agreed. Clien knows the price in advance. In theory it sound simple. But in practice, there are complications. One is inflation which results invariably in price increases. The other is variations. Contractors taking advantage of this, try to make money. Therefore many price in advance contracts effectively become cost reimbursement contracts at the settlement of the final accounts. Thus clients were not totally satisfied with this system either Their demands for better performance of buildings, speed and economy, increased. It was evident that change was essential. The first change came in USA, during the recession of tne 1950 s. They found that the proposals put forward by designers were high on cost but low on buildability. There came a growing awareness that contractor with superior knowledge of construction could contribute much during design They started questioning the logic of designer - builder separation. The result was the introduction of the D & B path as a new form of contract procurement.

During 1970 's, when UK too was facing a recession, similar trends started emerging there. By mid 1970's D & B was well established in the UK. Recent surveys have shown that in the UK, the most significant and constant growth during the last decade has been in Design & Build.

Position in Sri Lanka

It is not wrong to say that the Sri Lankan construction industry is having problems. Many contractors tender below cost Government regulations which recommend jobs to be given to the lowest evaluated bid sometimes aggravate these problems. When work cannot be completed, contractors resort to various tactics in order to recover losses. Sometimes contractors go bankrupt. Other times parties end up in courts. During the recession in the industry of the late 1980's these problems became more accute- Change became unavoidable Therefote it was not suprising that the industry started experimenting with new procurement techniques. The last few years saw a number of multimillion rupee building projects being let on a D & B basis.

If these trends are anything to go by, we may see more and more buildings being let on the same basis in the future. However this will depend to a great extent on the suitablity of this system to S.L. and the success of the said projects.

Design & Build Path And The Role of The Professional

Under D & B, client has two alternatives. One is to select a suitable contractor on reputation and negotiate a price for the entire service. This ensures maximum speed but no competition.

Under direct D & B, the client's or his adviser's negotiating skills determine whether the clienf gets the best deal going Here no mention of price is made when contract is signed. The brief may not be in the form of a performance specification since client can be very much associated with the design process. only when the proposals are accepted will the price be fixed.

In competitive D & B tenders are called from suitable contractors. The basis for competition can vary. It could be a simple brief explaning the client's requirements, with or without the mention of a price. At the other extreme it could consist of sketch proposal and a detailed performance specification.

The role of the professionals under D & B has changed drastically. The most significant is that the designers now work for the contractors as against their more independent role under the traditional system. Figures 1 & 2 illustrate the new role played by the professionals. Although the individual professional's hands certainly are full under D & B, whether he be an Architect, Engineer or Quantity Surveyor, it is true te say that the consultant's influence on the project under D & B is somewhat curtailed This therefore could be an area which may cause friction in introducing D & B to S. L.

Critical Apprasial OD Design & Build Path

The selection of the most suitable procurement path for a project is a complex problem. Since the procurement system it self is a system of a more complex and wider supra system. (Figure 3) Therefore the right decision reguires a thorough understanding of the merits and demerits of each procurement path.

Advantages of the D & B path

(1) It simplifies the lines of communication. This ensures quick response and thus and overall time saving.

(2) Single point responsibility. There is no question of passing the buck between designer and builder.

(3) Expertise of the contractor can be obtained for the design, especially of complex structures.

(4) Client knows his total financial commitment early in the life of the project. This is due to the firm nature of the price and the inherent nature of the system which discourages variations.

(5) Overlap of design and construction is possibie. This would mean a time saving, However some clients may prefer to finalise the design before commencing construction to avoid misunderstandings later on.

(6) Design may not be as detailed as under the traditianel system since contractor would be using techhiques familiar to him Therefore the design shou:d cost less.

(7) Since Contractor is doing the design he would invariably thin of buildablity. Thus he should at least in theory, be able to provide a morke economic building.

(8) It is widely accepted that D & B path is speedier due to the above mentioned reasons as well as due to greater co–ordination and prompt decision making.

(9) The tedious job of preparing a BOQ is avoided. However, it is true ot say that an efficient brief, if in the form of a tightly written performance specification will require great attention.

(10) Even where the client nominates the designer, there is bound to be greater co–operation since the designer and the builder will form a single team-

(11) It prevents the unfair pratice of putting the responsibility of rectifying design errors on the contractor.

(12) Competitive D & B provides the owner an added benifit since he can not only select the most economic bid, but also select from amoung number of alternative dasign solutions.

(13) The prodlem of most contractual claims could be effectively overcome.

Disadvantaoes of the D & B path

(1) Thouge the design may be more economic, it may be less attractive aesthetically., It could be argued that it is not only the cost proposals that are compared but also the design proposals. However,

in practice it's ultimately the cost that wins a job. Therefore the above statement could be true to a great extent. This means that where asthetics are the highest priority of the clients; D & B would not be the best procurement path.

(2) The contractor may have a vested intrest in advising the client on design matters. What this means is that a prudent client not totally familiar with construction work should take the service of an independant adviser.

)3) Variations cost a lot. Usually are paid based on a schedule of rates. However this same schedule is not the main criterion in selecting contractors. Therefore there is nothing to prevent the contractor from inflating the rates in the schedule. This therefore is a potential disadvatage to those clients who consider variations during construction stage as a necessity.

(4) The client's brief has to be thorough. If not, the design may not ultimately fulfill the client's requirements. The preparation of a thorough brief is not within the capablity of most clients. This is another reason why a client needs an adviser.

(5) Evaluation of contractor's proposals is difficult. It has to be extremely thorough. Otherwise the contractor may later on claim that the original proposals did not include certain parts and ask for variations.

(6) There is a feeling that quality ofbuldings obtained tnrough D & B.path is low. This was the prevelent feeling even in UK during early days of D & B. But now This has disapdeared to a great extent. The argument is that there is no reason why a tightly written performance specification shouldn't acheive a good quality building.

(7) The basis of the tender Is vague. Therefore, tender bids sometimes vary by wide margins, due to the contractor misunderstanding the brief

(8) It can be argued that since the preparation of the tender bid including the design proposals costs a fair amount, many contractors may not like to tender bids since they are not certain of being selected. But, in practice this argument is not valid. It may be due to the popularity of D & B system among contractors.

(9) The absence of consultant who enjoys quasi – judiciary status could lead to disputes. Howeuer from a Sri - Lankan context, this woudl not be relevent where a project manager is appointed upon whom all these quasi-judiciary functihns are conferred.

DESIGN & BUILD IN SRI LANKA

Problems identified by industry personnel in a survey carried out by tne author

These were identified as problems which are more oı less specific to S. L.

a) Quality of dsign : This was related by many to the under-developed nature of many contracting organisations. The capabilitiy of many contractins The capability of many, to provide a good design is suspect. The majority of contractors have no qualified personnel. There are only a handful of organisations that employ Architects. Therfore the solution has been to form a temporary merger with a design firm. But again, an under - developed eonfracting organisation merging with a design firm with qualified personnel is unrealist c in a commercial sanse. Therefore what heppens in paactice is that only the larger contracting organisations are involved in such joint ventures. For small contracting orgnisations, subletting the design is possible. But the management skills erquirad of a D & B contractor may not be present in such small organisations. Therefore, in selecting the D & B contractors, the client must be extreamely careful if the project is to be a success. In a wider sense, the success of the system itself will depend to a great extent on the success of the early projects. Therefore it is important to have high selection criteria.

b) This however would lead to another problem, that of monopolies. Only the largest contracting organisations will be pre-qualified. When there are only a few contracting organisations offering D & B services the competition to gat jobs will reduce thus resulting in high tender bids. This is undesireable. It is also unlikely thaı such a thing wo ⊏ ld occur. Therefore it is unrealistic to expect that D & B will replace the traditional system. However this has a benefit too More contracting organisations will try to become professional so that they can tender for D & B projects. This would ultimately contribute towards increased efficiency in the industry.

c) Professional jelousied : Majority of those who responded to the survey agreed on the existence of professional jealousies of some form. Some prefered to call jt poefered it professional protectionism Irrespective of terminology, it should be accapted that suhe a thing exists: This, together with the tendency of man to resist change forms a considerable force against the iutroduction of a new system of

contract procurement. This is espeoialy so because D & B system effects a revolutionars change in making the contractor responsible for the design, Howaver everybody who accepted, the existence of professional jealousiet falt that if the system works properly, there will be no room for resistance to change.

d) Insufficient project management services. As discussed earlier, a prudent client should have a representative to look after his interests. However in S. L. there are only a handrul or organisations that provide such services. One reason may be the fact that there are only a few Q.S'S in the country who could play such a monitoring role as the client's representative Anyway this certainly is a problem facing D & B path and if the system is to succeed, improvements will have to be made on this aspect.

e) Government Regulations, There is a regulation that all public sector building contracts should be measure and pay fluctuating cost contracts based on ICTAD conditions of contract. Thie is a hindrance to the introduction of D & B system to government sector building proccurement. Howeveer it is unlikely that this would become a major problem because changing the regulations will not be a ploblem if the system is providing the desired results.

f) Lank of awareness in non-traditional forms of contracts : Most clients are ignorant of the availability of alternative forms of contracual arrangements. It was indeed suprising that even some profe-ssionals immediately thought D & B to by synonymous with speculative building. Howevr the lack of awareness among clients is not surprising since D & B is comparatively new to S. L. In any case, depending on the success of the system, it is likely that more clients will become aware of it.

The above findings show that there are certainly problems in establising D & B in S. L. It is clso clear hat, things as they are today, D & B system does not suit all types of buildings. This was infact accepted even by the contractors. However the majority who responded to the survey felt that these problems chuld be overcome and that there is a future for D & B in S. L.

Conclusions

There is little argument that some form of changs is necesary in order to increase the efficiency of the Sri Lankan construction industy. This is especially important since, construction industry is the life blood of economic development.

However change should not be for the sake of change. Resorting to a new procurement technique like D & B was a change effected with the objective of achieving greater efficiency. The main thrust of this system is to bring together the designer and the builder. The result in a broad sense should be greater buildability. In theory, greater buildability should ensure a more economic building. Otherwise the concept of buildability itself would become a nonentity Therefore it is up to the individual clients and their advisers to take full advantage of this system.

With D & B there should be a time saving due to contractor doing the design, greater co-ordination, and flexibility in operations. Further quality should not be a problem where a tight performance specification is the basis of the contract.

It should also be borne in mind that whilst the traditional system has been criticised a lot in the past, it has worked well for some clients. The expectations in terms of time, cost and quality have been met. Therefore what should be sought is a right balance be tween the proven success of the traditional system to satisfy certain project needs and the known ability of D & B path to fulfill requirements of industial, housing, educational and similar sectors.

The social divide between professional advisers and contractors is prevelent to a very high degree in S. L. If non-traditional forms of contract are to succeed, this has to be reduced and it must be established that contractors can operate at a professional level.

It must also be understood - that eventhough the process of change is painful to some, the increasing client requirements demand more rational methods of desing and construction, managed not by a particular profession, but by those individual professionals who are most talented to do so, whether they be Architects, Engineers or Quantity Surveyors, working as consultants or builders.

In conclusion, it can be said that D & B certainly has a place in S. L. not merely because everything has a place on earth, but rather because this system suits some project needs better than other systems. Therefore it should be totally worth the while, where a number of alternative procrument paths is at the disposal of the professional adviser to the client, to measure and evaluate the primary objectives of major projects to ascertain which system suits those particular projects best.

Building Maintenance In Sri Lanka

by

David I. Andrews

B. Sc (Hons) ARICS

In all countries of the world, buildings and other construction products are of paramount importance to society. Accordingly, all contries have a construction industry. Buildings and civil engineering structures are however, not infinitely durable, and thus no country is devoid of significant construction maintenance activity Further, the needs of the user change during the life of the structure, and thus the structure may require modification to prevent obsolescence.

The proportion of construction maintenance to the total construction output is undoubtedly very large, probably around 35% to 60%, although almost certainly varying from one country to another. Precise determination of the maintenanance elementt of the industry is extremely difficult in all countries, and especially in those countries where the actual meaning of maintenance is not widely understood, and where the "informal" sector is large.

The areas of work that come under the heading of maintenance are rarely fully realised. The average lay-person would perceive maintenance as merely repairing building defects, and possibly the servicing of plant and equipment installations within a builbing.

Effective building maintenance can be defined "all technical, contractual and managerial operations required to ensure that a building is maintained in a condition and state, where the maximum level of utility can be gained at the least possible cost, and that the net ret return from the building may be maximised". This definition is very broad, and thus includes all repairing, improving, upgrading, extending, converting, modifying, cleaning, operations required during the building's life. On the assumption that the above is accepted as an accurate definition, it then becomes clear that building (or construction) maintenance covers a very large percentage of construction work. In the U. K., building maintent-

enance work represents over fifty percent of the total volume of building construction work. In reality, the percentage is likely to be higher, as a consequence of the activities of the "informal" sectors not being taken into account. The "informal" sectors would also include building owners, who execute work themselves. A large amount of building maintentenance is done by building owners and by the small "informal" contractor. The smaller "informal" contractor is more likel to become involved in small scale and piece-meal works, than the larger "formal" and recorded contractors.

Not only is the scale of maintenance work underestimated, but the importance of maintenance work is not widely appreciated.

Neglecting maintenance willfully, or due to ignorance of its relevance, has serious implications. Firstly the significance of the proverb "A stitch in time saves nine", can not be over emphasised. For the majority of buildng defects the rate of deterioration is acceleratory, ie, the longer you leave it, the worse it gets. Further, in several cases, non-maintenance leads to "the domino-effect" or chain reaction, ie the failure of one component may trigger the failure of several other components in juxtaposition. Take for example, a precarious television antenna poorly secured to a chimney stack above the roof of a house. The immediate and obvious risk, is that should the antenna fall, then successful television reception would be jeopardied. However in reality, if the antenna falls, then it becomes damaged, necessitating its replacement, tiles on the roof become broken, tiles in the vicinity are loosened and may be further disrupted by wind, leading to more tiles being lost, water will penetrate into the roof structure, timbers will become wet, fungal decay of the timbers may occur, plastered finishes will decay, decorations will be stained, damage wili occur to furnishings and contents, a damp, mouldy and unhealthy living environment will develop and the loose and jagged pieces of broken tile will slide down the roof, block up the eaves gutter, causing it to overflow, cause more dampness, and possibly fall off the roof onto a passer-by's head, which may cause the building owner to be sued for occupier's liability. The above example should be obvious to the majority, but illustrates that the need for timely maintenance is essential.

Maintenance is not only the key to keepiog in a satisfactory condition, but it is also the means of keeping them utilised. Obsolescence and subsequent redundancy of buildings can be off-set by effective maintenance. Optimising the utility deriveable from a building is one important aspect of maintenance, ie including conversion and improvement works. The full potential of existing, and often under used building stock stemc from an underdevelopment of the rehabilitation and conversion sectors of the maintenance part of the industry.

The U. K., by means of sharp contrast to Sri Lanka, has a very well developed maintenance industry, with hundreds of contractors specialising in the field of building maintenance, supported by numerous specialist sub contractors and product manufacturers, who provide services and materials specifically developed for maintenance problems. Despite the progress made in developing maintenance in the U. K, massive short-falls still exist, especially in public sector housing. Thare are still many building owners in lhe U. K. who see maintenance as an unnecessary and avoidable cost, that generally only improves buildings cosmetically. These "unfortunates" join the large population of "build and forget" ihdividuals, who fail to allocate funds for future maintenance at the outset of a building project. Many clients do take an atcive interest in assessing the future maintenance requirements, however, there are many who don't.

The situation in Sri Lanka is patently far worse. But why is it so?. Although the U. K. is not without financial problems, Sri Lanka is far poorer. The cash for executing maintenance work is scarcer, and thus the building woner is under more pressure to defer maintenance until next year, or until the situation is critical, for example, when part of the building falls off on to some body's head. The second reason is, that Sri Lanka is a developing country. A larger percentage of work concerns the construction of new buildings, as urbanisation and industrialisation steam ahead. Therefore more emphasis is placed on the development of efficiency of new construction, neglecting methods for existing buiidings. The above, coupled with the relatively young age structure of the present stock, (which requires less maintenance than the older structures forming ths majority of the building stock in the U. K.), means that maintenance fails to attract the attention it deserves.

Non of the above, however, excuses the neglect of building maintenance in Sri Lanka. The deferral of maintenance will only cost more in the long run, and the longer it is deferred, the more it will increase in cost. In addition, tremendous advantages accrue from commencing planned maintenance at the earliest possible point in a building's life. A much larger percentage of Sri Lanka's building stock has been constructed since the Second World War, than the percentage of the U. K.'s building stock in the same period. As a consequence, it may be seen the that the age strucrure of Sri Lankan building stock is significantly less than the U. K Sri Lanka thus has the valuable opportunity of setting Deffective maintenance policies in motion now, rather than attempting to repair Her present buildings in twenty to thirty years, by which time a large percentage will have gone long beyond a point of economical rehabilitation. Great advantages can be gained from "nipping maintenance work in the bud"

If one accepts that planned, well managed, regular maintenance will pay dividends, and that the time to start a major thrust in the direction of building maintenance is now, the qusestion is, how can it be implemented?

Firstly, before the above question is considered, one shou'd consider if the maintentenance can be reduced. Although maintenance is both desirable and extremely important, it would be beneficial if it could be prevented at the time of construction, ie to encourage the construction of maintenance free buildings. One hundred percent maintenance free buildings do not exist, and never will, and the most economical solution is not necessarily to minimis maintenance. The designer must strive for the least total cost solution for a building. ie the initial building cost, plus the maintenance (and operation) costs. The least total cost, will be a carefully determined combination of initial building costs, and the subsequence costs. In Sri Lanka, it would appear that an increase in the initial building.

Cost, would result in over all savings. Savings are possible through better quality (and inevitably more expensive) buildings, ie buildings, that are more durable, and also buildings that are more easily and cheaply repaired, upgraded, enlarged and/or converted to different uses.

Designers must becme accustomed to thinking in terms of total life cycle costs, indeed this philosophy should be a statutory requirement, just as the initial quality of buildings are controlled in the municipal areas. Quality control must join cost control, to control total life cycle costs.

Focusing on two fundamental and maintenance prone materials used extensively in construction in Sri Lanka, ie reinforced concrete and timber, huge improvements can be detected.

Sri Lanka has lumbered Herself with hundreds of thousands of suspect reinforced concrete structures, which are just beginning to unleash a plague of concrete defects and ultimately, failures, requiring massive repairing expenditure, or early age replacement, that the country simply can not afford. The culprits are both defective design, and bad workmanship. The industry must change its ways in this regard immediately, so as to prevent further addition to the present day stock of suspect structures. Proper batching, mixing, compaction and curing of concrete are needed, together with adequate cement contents and sufficient "eover" to the reinforcement bars.

The termite attack of timber, particularly the less durable species which are coming into use, also poses a major problem. The pre treatment of timber, including attention to the cut surfaces exposed during construction, would be a valuable weapon against this problem. Greater use, and possibly more effective application of preservatives needs to be considered. The envirenmental and ecological implications of the incresed use of chemical presrvatives, must however be remem bered, and the treatment options available scrutinised.

Improved construction quality is the key to keeping future maintenance requirements to sensible proportions. The identification of the areas of construction which need attenrion to improve the overall quality of the building, may be learnt in part from an examination of today's (and hopefully not tomorrow's) maintenance problems and requirements.

The remaining question is how to deal with the maintenance of today's building stock.

Specialist contractors, for example timber treatment firms and reinforced concrete repair ccntractors are needed. Professionals with maintenance policy, organisation and technology skills are required to plan, procure and specify maintenance work effectively, and to obtain the best value for money for his/her investment, over the full design life of a building.

Training for operatives in certain fields is required, for example, reinforced concete repairs need special care and skills, and these repairs are commonly short lived, if executed by normal workman unaware of the special measures necessary.

Certain products required for mainteeance work, for example polymer modified repair mortars for reinforced concrete repairs, rust preventing paints, water proof sealants and timber preservatives, are difficult to obtain, and often necssitate expenive imports. These "maintenance materials" should and could be manufactured in Sri Lanka.

Despite the above, maintenance is not new in Sri Lanka. Impressive progress has be made in the preservation and reconstrution of the countries ancient cities and other historic monuments. A large number of trained specialists in conservation are present in the country. University courses are conducted in the specialist area of restoration. A valuable bank of expertise is available,

particularlarly in the technological field. This expertise couid be tapped and couid contribute to increased maintenance knowledge for the more modern buildings.

Sri Lanka's heritage of Colonial Architecture not only requires the protection of conservation regulations, but also the availability of effective maintenance, both in terms of technology, and in terms of careful selection of economically viable modern day uses.

The greatest difficulty however, is to raise the general comprehension of what effective maintenance can achieve for the buildinge owner and investor, in addition to the obvious benefits for the building user and for the society, environment and economy at large.

Maintenance is expensive. Effective maintenance is even mort expensive. Well planned, properly organised and carefuliy admlnisteted maintenance executed by experienced and competent contractors. and correctly and accurately specified, will bring savings, not immediately, but in the long term.

Both the public and private sector building owners together with the finance instiutions and investors, must come to understand the critical importance of maintenance as part of the construction industry. Maintenance is not just some incidental or minor off-shoot of construction activity, but it is a major, and possibly the major, part of the construction industry. It is also interrelated to the new build activities, and thus must be viewed as an integral part of the whole industry, and not in isolation.

Maintenance expenditure must be viewed as investment of equal validity to the construction of new buildngs, and obvious ecological benefits flow from making the existing stock last longer and recycling, building rather than throwing them away and buying a new one.

On the subject of wasted resources, measures should be taken to ensure that the Sri Lankan construction industry doesn't blindly follow the disgraceful spectacle of the Western "throw away" disposable consumeristic society.

The converted, ie those who believe in "build and maintain", must stand up and preach to the unfortunates who worship "build and forget". It is the duty of the industries professinals to "educate" the industries clientele building owners, financiers and policy makers in the area of maintenance.

David I. Andrewes is a Chartered Buildng Sarveyor and a Lecturer of the Department of Bulding Ecormics, University of Moratuwa.

Risk Management

By

Lakshman Ramanayaka
B. Sc (Qs) Hons

Introduction

Risk management, as applied in the construction Industry, is used to deal with risk occured in cost estimating or construction. It is particularly appropriate to the current economic environment, when the out comes of any risk may influence the fesaibility of a project or, certainly the amount of contingency sum which must be included in the capital investment itself to reduce the chance of probabilities of cost over run as the project progress.

What is risk management ?

Risk management is a broad term used to cover the process activity or study for the identification of the potential areas of risk by employing different risk analysis techniques distingnishing between risk and uncertainty.

Construction industry always involves risk of an unknown charactor. The Contractor is continuously faced with a variety of situations involving many unknown, unexpected frequently undesirable and often inpredictable factors. These faetors can be grouped together in the category of risk and uncertainty.

Nowaday, there is some confusion, with the term 'risk' being synonymons to 'uncertainty'. However, with risk management such distinctions are usually necessary and must be clarified. Risk can be assessed statistically by the distribution curve or probability of occurance of all possible out comes impinging project from past experience or data with a reasonable degree of accuracy. Uncertainty, on the other hand, applies to situations of a unique charactor. Here, the

probability of each out comes occurance in unknown or cannot be assessed.

In summary, risk is a measurable uncertainty while uncertainty is an unmeasurable risk.

Management of risk

Risk and uncertainty cannot be avoided from any construction investment.

The following methodologies can be applied to a management of isk.

a. Activity identification

Activity identification act as a frame work subsequent to the analysis. In the construction Industry there are number of planing and scheduling techniques.

A network will provide the necessary breakdown of the project but if necessary, a separate activity detail list will be used to identify the work involved in each particular activity.

b. Risk Identification

After identifying the activities associated with a project, it is necessary to identify and assess the risk.

In the early stages of project appropriate risk identificatton can be applied directly in establishing project constraints and is useful for making a choice between different projects.

Risk analysis

Risk analysis can be defined as the quantification of risk and uncertainties in terms of cost, time or revenue and their effects upon profitability.

Instead of estimating a single value for any predictions or forecasts' a range of values to the input data is allowed. The principle is to try to apply profitabilities genarated by statistical analysis toany value used, so as to weigh the poesible outcomes to a mor likely result.

However, for many construction risk analysis, a data bank is needed to calculate the profitability of occurance of specific out comes. Usually there are hindrances which lead to some professionals being doubtful about the value of any form of risk analysis This can be due to:

(i) Insufficient project data
(ii) Data too subjective
(iii) Data which cannot be known
(iv) Date requires long research (or long time to established)
(v) Data which, although known is not available to the professional, because it is inaccessible of by a confidential nature or because he is Incapable of understanding it.

Risk analyals Techniques

Techniques for risk analysis have been established and widely used in the business management field for a number of years. But their practical application for construction and engineering projects is limited to very large contractors and a few large multi disciplinary consultants.

Following techniques may useful for the risk analysis.

a. Semi analysis
b Proffiablug distribution analysis
c. Decision free analysis
d. Monte carlo technique
e. Utility theory
f. Game theory

Conclusion

Risk management is a powerful tool for cost management. But the construction and consultant organisations in Sri Lanka appears to resist its use as a tool for the dscision maker. It can be applied in the early phase of a project, where project overview is essential. In the later stage, risk analysis act as a continuous and on going assestment of risk inherent in the project.

1 Ashworth A. & Skitlmore R. M. (1981) Accuracy in Estimting The charted institute of Building occassional Paper No 27
2 Perry J. G. and Hayes R. w. 1985 Risk and its management in Gonstruction Industry.
3 Hillebrandt p. m. 1985 Economic thocry and the Construction Industry.

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