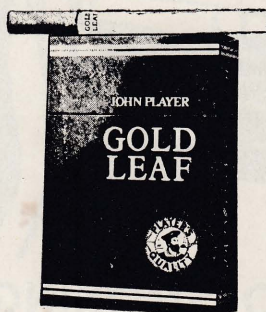




TOBACCO CULTIVATION AND PROMOTION

Tobacco is claimed to not merely have endangered lives but also parts of fertile lands in the country. According to the President of the Sri Lanka National Federation on Smoking and Health, nearly 40,000 acres are used annually for tobacco cultivation, chiefly in the Hewaheta area of Kandy district, and in the lower plains of N.W.P. If one visits these areas one could see the extent to which land in Hewaheta has been completely denuded and hill tops exposed for the cultivation of tobacco. In the lower plains fertile paddy fields have been converted into tobacco plantations. The Ceylon Tobacco Company and the Ceylon Tobacco Corporation encourage the cultivation of Tobacco by giving subsidies to the cultivators and tobacco cultivation generates a substantial income to the farmers: although encouragement to peasants to grow alternative food crops is not given. Hill tops in Dumbara which are denuded of all vegetation are exposed to considerable erosion and as a result much fertile soil is washed into the river basins below. As indicated in section of our Special Report in this issue, the excise duty collected by the Government on tobacco and its products, will not compensate for the ill-effects of smoking and the contributing ill-health of the people.

No single factor has influenced the promotion of the smoking habit and sales of tobacco based products than the advertising media. The campaign against the danger of tobacco smoking has struck at the root of cigarette sales promotion by attempting to eliminate the effectiveness of the cigarette ad. Not easily outdone, cigarette manufacturers have continued their promotion through devious means such as sponsorship of the arts and sports as seen in this typical local example in the picture at right. The ad-media are now being used effectively by the anti-smoking lobby to get their message across, as illustrated below.



A John Player invitation to
an exhibition of paintings and drawings by



Senaka Senanayake



Senaka Senanayake is the best internationally known painter and sculptor in Sri Lanka today.

Since his first exhibition held in 1959 when he was only 8 years old, Senaka Senanayake's work has been continually exhibited on invitation from recognised art institutions.

To date he has held over 95 one-man exhibitions in eighteen countries.

His work is on display in prestigious institutions around the world including the United Nations Building in New York, the White House, the Berlin State Museum, the Lidice Museum and the Dallas Museum of Fine Arts.

We are privileged to be associated with the exhibition.

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19-23
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THE ECONOMIC REVIEW is intended to promote knowledge of and interest in the economy and economic development process by a many sided presentation of views & reportage, facts and debate.

THE ECONOMIC REVIEW is a community service project of the People's Bank. Its contents, however, are the result of editorial considerations only and do not necessarily reflect Bank policies or the official viewpoint. Signed feature articles also are the personal views of the authors and do not represent the institutions to which they are attached. Similar contributions as well as comments and viewpoints are welcome.

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- * The FTZ - four years after. Who has come in; what are the products; what is the investment; how are the labour conditions, etc. A comprehensive survey
- * Monetary policy and economic stabilization in Sri Lanka
- * Child labour in a rural area - a case study
- * Import substitution and export oriented industrialisation
- * The world's poorest nations - where does Sri Lanka stand

COVER

S. H. Sarath

DIARY OF EVENTS

March

- 1 Venezuela cut the price of its heavy and extra heavy crude oil by US\$ 2.50 a barrel, its Energy and Mines Ministry announced. The cut will bring prices to a range of between \$18.90 to \$ 27.12 a barrel.

The U.K. Government's British National Oil Corporation (BNOC) was proposing a sharp 4 dollar cut from 35 to 31 dollars a barrel in North Sea oil prices, oil Ministry sources said in London.

The price of gold fell below \$350 dollars an ounce in London for the first time in 2½ years continuing a long price decline with no signs of ending. This was the lowest since September 1979 and was \$ 6.50 below the previous day's close of 353.50 dollars.

- 7 Meeting in Doha, Qatar, the key Ministers of OPEC informally agreed to cut the oil output to prevent an oil glut and defend current prices stated a Reuter report from London.

A Regional Survey Report prepared by the ESCAP states that increasing poverty, slow growth of incomes, lack of employment and chronic trade deficits continue to blight economic programmes of South Asia, while in contrast Taiwan, Hong Kong, South Korea and five member states of the ASEAN maintained strong rates of economic growth in 1981 amidst world recession, according to a despatch from Bangkok.

Countries of South East Asia were among the poorest in the world, with per capita incomes ranging from the lowest US\$ 80 in Bhutan to US \$ 260 in Pakistan, the report added.

- 10 Two foreign funding organisations — The Community Aid Abroad, Australia; and Freedom from Hunger Campaign, West Germany have agreed to grant Rs. 14 million for the expansion of the Tantirimale project in Anuradhapura district and Rs. 10 million for the Waguruwela project in the Moneragala district respectively, according to an official announcement.

- 12 The government has decided to increase by 42% the value of Food Stamps now issued to 750,000 persons to make up for the rise in prices of commodities. This increase will cost the exchequer an additional Rs. 1,000 million, according to an official spokesman. This is as a consequence to a study recently carried out by the Ministry of Plan Implementation (Nutritional Division) which showed that the real value of Food Stamps had dropped by 42% due to escalating prices. The decision is to restore in real terms the purchasing power of the food stamps as it stood in September 1979.

- 14 The Government approved a proposal by the Minister of Fisheries to write off a total of Rs. 25 million being irrecoverable loans given to fishermen prior to 1968.

The US AID will provide \$ 48 million to Sri Lanka in 1982, states a report from New York. Along with the \$ 93 million in US development Aid already in the pipe line Sri Lanka will receive a total of US \$ 141.7 million this year. For the first time US project aid this year includes provision for expenditures on private investmental promotion. Out of \$ 48 million for this year the US had earmarked \$ 2 million for projects designed to promote American foreign private investment in Sri Lanka. In addition to project aid, US AID has also allocated \$ 25 million for food aid and \$ 25 million for housing investment guarantees for this year.

IDA, an affiliate of the World Bank, approved a credit of Rs. 735 million for joint financing the foreign cost of the Kotmale transmission project. The OPEC Fund will contribute Rs. 235 million towards the foreign cost while the local costs are to be met by the Ceylon Electricity Board.

- 18 Washington—The US recorded a 6.6 billion dollar surplus in its balance of payments with foreign countries in 1981 the biggest surplus since 1975 for the widest measure of US economic transaction abroad, the government reported today.

- 19 Switzerland, West Germany and the Netherlands acting in concert announced interest rate costs effective today despite the continuing high level of US rates officials at the Central Bank of all three countries said there had been prior consultation but each bank gave different reasons for their moves (Asian Wall Street Journal).

Despite massive intervention by the Bank of France the dollar soared 1.1% to 6.2075 francs in late New York dealings from the previous day's 6.1375, hitting a record high against the Italian Lira.

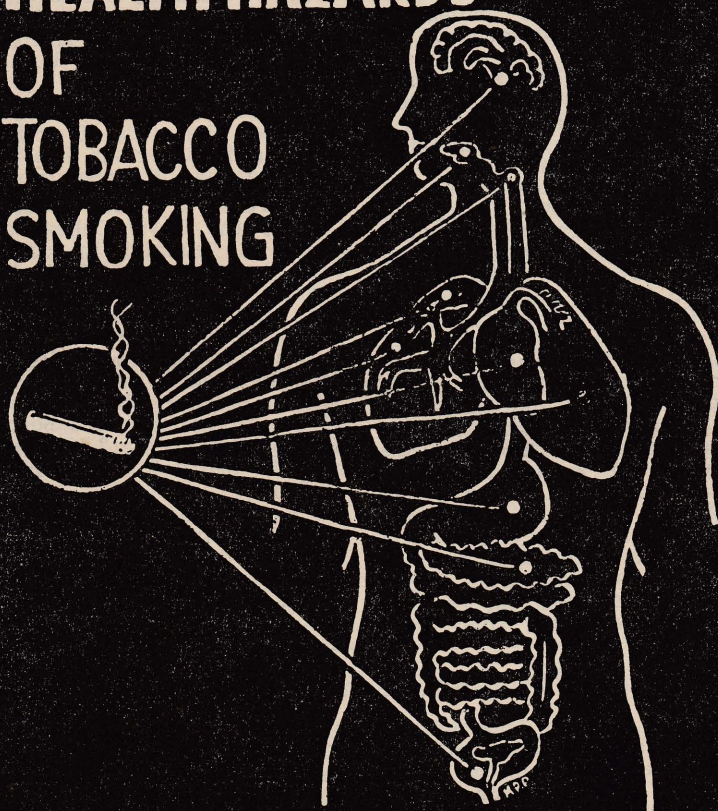
- 25 The Government approved a draft convention for the avoidance of double taxation between the government of Sri Lanka and the governments of Finland, Belgium, Romania and USA.

Under the proposed convention shipping profits will be taxed in the country of source with a reduction of taxation by 50 per cent. However, in the case of airline profits tax exemptions are granted in the source country — a principle adopted by all countries.

The Government approved the signing of loan agreements with USA to enable acceptance of US \$ 25 million for the Mahaweli Basin development Phase II and a loan of US\$ 15 million for the Mahaweli sector support.

The Government also approved a recommendation for a loan of US\$ 10 million approx. Rs. 205 million) from the Asian Development Bank for a community forestry project.

HEALTH HAZARDS OF TOBACCO SMOKING



ECONOMY OF TOBACCO SMOKING

In the early 16th century, the Spanish explorers of America discovered that the natives smoked pipes containing dried tobacco leaves. They introduced this to Europe, and the English explorers of the new world brought tobacco — *Nicotiana tabacum* — to England in 1558. By the end of that century tobacco was imported to England on a commercial scale sufficient to warrant the imposition of a duty. Throughout the subsequent years the rate of smoking tobacco rose steadily, mostly in the form of pipe smoking.

It is remarkable that tobacco should have attained such rapid popularity among people quite unaccustomed to it, especially as the early tobacco smoke had a much higher nicotine content.

Tobacco was recommended for its medicinal value by Jean Nicot French Ambassador to Lisbon after

whom nicotine was named. It was highly rated as a prophylactic against many ills and also as a restorative. But it was also condemned as a vice by James I of England. However, since the 16th century tobacco smoking has increased not only in Europe but throughout the world.

Cigarettes were first manufactured in Spain in the middle of the 17th century, and English soldiers returning from the Crimean War introduced cigarette smoking to England.

Towards the end of the 17th century smoking was largely replaced in fashionable circles by snuff taking, but the ordinary man continued to smoke pipes. Cigars were introduced at the beginning of the 19th century and their use never became widespread except on the Continent.

The production of milder tobaccos in Virginia, and the development of the briar pipe in 1860 together with increasing prosperity resulted in a further steady rise of tobacco consumption throughout the 19th century.

Cigarettes began to be popular at the beginning of the present century and cigarettes have steadily tended to replace the other forms of smoking. Women hardly ever smoked until the first World War. Since then cigarette smoking by women has increased, and accelerated sharply during World War II, though subsequently there was a decline. Cigarette smoking by women is less frequent than among men.

Tobacco smoking appears to have been introduced to Sri Lanka by the Portuguese during the latter part of the 16th century, though it became commercially important in the 19th century. (See box on page 4).

CIGARETTES AND TOBACCO

There has been a marked increase in the consumption of cigarettes in Sri Lanka. The Annual Report of the Ceylon Tobacco Company for 1972 shows an increase of sales of cigarettes from 2,254,000 in 1969 to 3,219,000 in 1972 — increase of over 42 percent in three years. Then from 1972 — 1980 (Table I) it increased from 3,424 million to 5,225.5 million. This indicated an increase of nearly 53 percent during 8 years. Even taking into account the annual export of cigarettes, there is still an increase not only in the production but actual consumption of cigarette in Sri Lanka during this period.

TABLE I Production of Cigarettes and Tobacco 1972 — 1980

Year	Cigarette in millions	Tobacco Leaf in Cwts
1972	3424	809
1974	3912	658
1976	4181	743
1978	5098	708
1980	5225.5	366

Locally produced tobacco and manufactured cigarettes are exported to neighbouring countries. The quantity of cigarettes exported annually is about 250 million together with about a quarter million kilograms of tobacco.

BEEDI

The annual production of beedi from 1978 to 1980 is shown in Table II. Beedi production has increased from 1978 to 1979 but there is a marked decline in 1980, by nearly 50 percent compared to 1977. This is regarded a favourable trend specially as beedi is consumed not only by the lower income groups but also by those whose education is low.

TABLE II Beedi Production, 1978 - 1980

Year	Quantity in millions
1978	2036.2
1979	2657.5
1980	1363.7

TOBACCO CULTIVATION

The extent of tobacco cultivation in acres by years from 1970 — 1980 is given in Table III. The area cultivated has increased from 30,640 acres in 1970 to 38,780 acres in 1980. The highest was in 1979 when 41,710 acres were under tobacco cultivation. This is being regarded as a considerable extent of land to be brought under cultivation to produce a product which is injurious to the health and well being of the people of this country. A strong argument is that this land could be profitably used, particularly for the cultivation of foodstuffs.

For flue drying of tobacco, a large quantity of fire wood is needed, estimated at as much as one acre of fire wood for one acre production of tobacco. On this basis the actual devastation that would take place in extent of land would be about 80,000 acres.

TABLE III
Acreage of Tobacco Cultivation by year. 1970—1980

Years	Acres
1970	30,640
1971	26,130
1972	32,280
1973	29,830
1974	24,800
1975	28,110
1976	32,890
1977	34,700
1978	33,870
1979	41,710
1980	38,780

CONSTITUENTS OF TOBACCO SMOKE

Tobacco smoke is a mixture of gases and minute droplets. After the smoke is inhaled, about 50 per cent of it is retained in the lungs and some of the droplets are deposited in the air tubes and air sacs in the lungs.

From a health hazard point of view, the most important constituents of tobacco smoke are:

- (a) Nicotine, about 90 percent of which is absorbed when the smoke is inhaled, and about 10 percent when not inhaled, and the chief effects of nicotine are on the heart and blood vessels, the digestive tract, the kidneys and the nervous system.
- (b) Tars which can produce cancer.
- (c) Irritants which chiefly affect the bronchial tubes
- (d) Carbon Monoxide which aggravates heart disease.

STUDIES ON SMOKING AND ECONOMICS OF HEALTH

Scientific studies carried out in several countries indicated that tobacco smoking was a grave health hazard. It shortened lives, played an important part in the causation of lung cancer, chronic bronchitis, diseases of the heart and blood vessels, stomach ulcers, cancer of the tongue, throat, gullet, pancreas and bladder. It could also result in abortions, still

births and death in early infancy when expectant mothers smoked during pregnancy.

The earliest recorded publication indicating the Health hazards of smoking was by Raymond Reid of U.S.A. in 1938. He demonstrated the short duration of life among tobacco smokers. However, this failed to rouse the health authorities to action.

It was not until 1950 and again in 1956 when the first study by Doll and Hill linked smoking and lung cancer and then the anti-smoking movement started in earnest.

Next was the publication of the first report of the Royal College of Physicians, London in 1962 showing the association on smoking with serious morbidity and mortality.

In 1964 a further publication appeared by Doll and Hill on the lower mortality of British Doctors who had stopped smoking. This was a 20 year study among British doctors. This study showed "that mortality was higher in cigarette smokers than in non-smokers and that the mortality of men who had begun to smoke cigarettes under 25 years of age and had continued to smoke only cigarettes was about double that of life long non-smokers. On this basis it is calculated that men who smoke 20 cigarettes a day take, on an average nearly 6 years off their lives

and that between a third and a half of all cigarette smokers die because of their smoking". In this same year the first report of the Surgeon General of U.S.A. on Smoking and Health was published. This report established a close link between cigarette smoking and several disabling diseases and indicated that cigarette smoking was a Health hazard of importance in the U.S. to warrant remedial action.

These studies "consolidated and amplified the mass of evidence that smoking is a serious health hazard and one that is preventable".

Further a report published in 1971 by the Royal College of Physicians of England in collaboration with several other Medical Organizations states that a habitual smoker's life is shortened on the average by 5½ minutes for each cigarette smoked and that in the United Kingdom the yearly deaths in men and women between the ages of 32 and 54 due to smoking has been estimated at 21,400 and 3,750 respectively and the death toll from lung cancer at 37,000.

In the United States it has been estimated that 360,000 persons die annually because of tobacco use, and that "smoking is the greatest public health hazard and the nation's most preventable cause of death".

Tobacco's Importance in the Colonial Economy

Tobacco was an important commercial crop in 19th century Ceylon and was a state monopoly in the British colony. Tobacco had also been cultivated and traded in the time of the Dutch and its introduction as a commercial crop can be traced to the time that the colonial powers governed the maritime provinces of the island.

Tobacco, according to historical records, was the main produce of the northern regions of the colony and the foundation of their prosperity. It was principally exported to Travancore in Southern India. It was also an important item of the Island's trade with the Malay peninsula and the Island's of the East Indies, although on the whole the volume of the external commerce of the colony was not considerable.

The tobacco trade was very attractive because of the profits it brought in before its decline. It was dominated by a group of middlemen, who gradually acquired the controlling interest of the buyer's market by advancing capital to the producers who were forced to pledge their produce in return. The profit in the trade was considerable—Captain J. T. Anderson, an English settler in Jaffna, who engaged in the Cochin trade, estimated his profits at one hundred and twenty five per cent—and its volume was variously estimated between two-thirds and four-fifths the entire foreign trade. The trade was largely clandestine because of the restrictions which the East India Company imposed upon it, by discriminatory duties and by its monopoly practices. The value of the trade, therefore, was not adequately reflected in the general customs returns of the colony, but nevertheless several Governors recognised its importance in the economy and made determined attempts to free it of restrictions. These floundered on the opposition of the East India Company, according to Vijaya Samaraweera in a chapter on Economic and Social Developments Under the British in the University History of Ceylon.

The main part of the tobacco trade in the North was with the Raja of Travancore who held a strict monopoly with the connivance of the East Indian Company. When the Ceylon Government attempted to break the Raja's hold over the market and secure a share of his profits it failed and the affects proved disastrous to the trade which then witnessed a rapid decline. It was only in the latter half of the 20th century that the local tobacco trade was again revived.

Health Hazards in Tobacco Smoking

LUNG CANCER

There has been a great increase in deaths from lung cancer in several countries during the last half century. This increase has been in men and women past middle age. Death rates from lung cancer increase steeply with the increasing consumption of cigarettes.

Men between the ages of 40 — 49 years who smoke over 20 cigarettes a day are about 10 — 15 times more likely to die of lung cancer and about three times more likely to die of heart disease. The differences in the relative risk of these two diseases are attributed to smoking as being the main cause.

Diagram I compares the incidence of lung cancer among smoking and non smoking men of all ages in the United Kingdom. The difference is most striking.

The risk of lung cancer is lower in pipe and cigar smokers than in cigarette smokers except where pipe or cigar are smoked in large numbers and the smoke is inhaled.

The incidence of lung cancer is still low in Sri Lanka today. This probably is because the people have not yet been exposed to heavy smoking for a sufficiently long period to produce the cancerous effects.

HEART AND BLOOD VESSELS

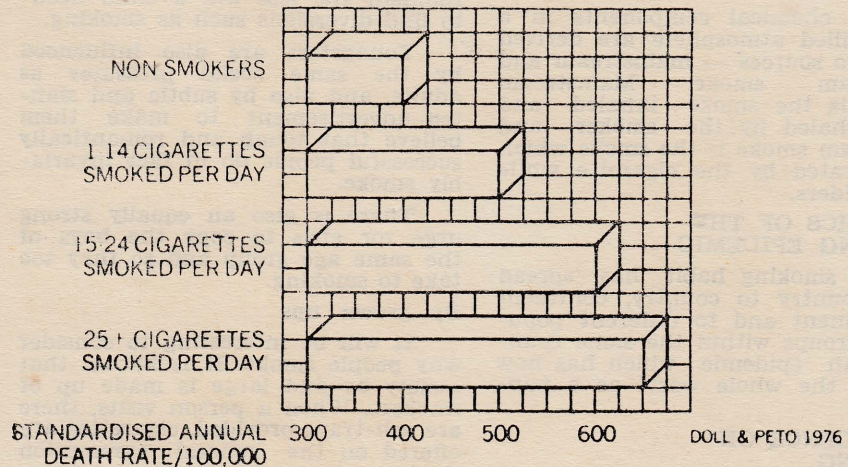
Although greater emphasis has been placed on lung cancer, there is strong evidence that heavy cigarette smoking is one of the most important contributory factors to the increased incidence of heart attacks.

Young men who die from heart attacks often have a history of heavy

is about a 70 percent greater chance of developing heart attacks among average cigarette smokers than among non-smokers of the same age. Smokers tend to get more heart attacks with more severe complications and have a greater tendency to die after attacks than non-smokers. When

The heart attacks are due to sudden blocking of the blood vessels which supply blood to the heart. This occurs as a result of progressive changes that occur in the inner lining of the blood vessel wall, leading to a gradual narrowing of the arteries to the heart. This has been compared to the formation of lime deposits in kettles. Here cigarette

CORONARY HEART DISEASE MEN ALL AGES



smokers give up smoking there is a rapid fall in the death rate from heart attacks compared to those who continue to smoke.

DIAGRAM II demonstrates the incidence of heart diseases among smokers and non smokers in the United Kingdom and the increased incidence according to the number of cigarettes smoked daily.

WHO SUFFERS?

Whilst doctors and others in the higher socio-economic groups are giving up smoking, men and women in unskilled manual work still smoke heavily.

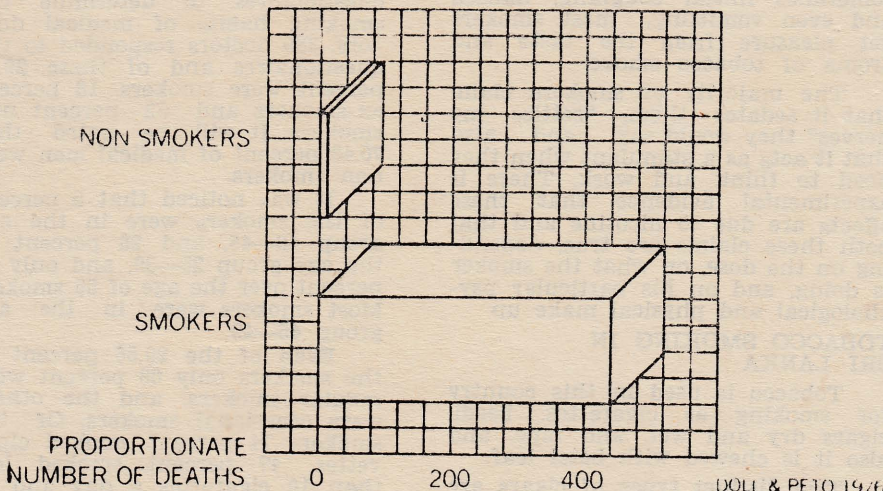
smoking may act independently or in combination with other major risk factors such as high blood pressure, stress, obesity and other diseases.

Cigarette smoking causes damage to the lining of blood vessels by inducing allergic reactions. Then calcium is deposited on the damaged lining leading to thickening and narrowing of the blood vessels. This allergy producing substance was found recently by a pathologist at Cornell Medical Centre in New York and he calls it tobacco glycoprotein.

OTHER EFFECTS

Most people have heard about the "smoker's cough". It is quite obvious that any cough would be aggravated by the irritant action of tobacco smoke leading to prolongation of the condition. Chronic cough results in a condition called Emphysema where the lung elasticity is lost and thereby the function of the lung is severely impaired. This is a very common and distressing disease in temperate climates and causes many deaths especially in middle aged and elderly men. Smokers, particularly cigarette smokers, are much more affected than non-smokers. Other factors like air pollution are contributory ones.

LUNG CANCER MEN ALL AGES



smoking. Liability to heart attacks increases with the increase in the number of cigarettes smoked, the duration of the smoking habit, and the amount of smoke inhaled. There

Cardiologists working in the Cardiology Unit at the General Hospital Colombo have found that cigarette smokers have a great risk of dying from heart attacks.

INVOLUNTARY OR PASSIVE SMOKING

Involuntary smoking is the inhalation of tobacco combustion products in smoke — filled atmospheres by a non-smoker. This type of exposure is, in a sense, "smoking", because the non-smoker breathes many of the same components of tobacco smoke that smokers ingest. It is also "involuntary" because this exposure is an unavoidable consequence of breathing in a smoke-filled environment.

The chemical components in a smoke-filled atmosphere are derived from two sources — mainstream and sidestream smoke. Mainstream smoke is the smoke inhaled and then exhaled by the smoker, and sidestream smoke is the smoke which is generated by the cigarette while it smoulders.

DYNAMICS OF THE SMOKING EPIDEMIC

The smoking habit has spread from country to country, continent to continent and to different population groups within the same country as an epidemic which has now covered the whole world as a pandemic.

DEPENDENCE ON SMOKING

There is definite evidence that smokers do become addicted to smoking. This means that the person so addicted suffers symptoms of an unpleasant nature when deprived of smoking. The addiction is really to nicotine and it has been noticed that smokers who change cigarettes from a higher nicotine yield, automatically increase their puff rate, or smoke more cigarettes in order to get the same amount of nicotine.

SMOKING HABITS

The habit of smoking is adopted during adolescence, but surveys in England have shown that in general 11 to 15 percent of boys smoke cigarettes by the age of 10, and this percentage rises by the age of 15, and at the age of 19 adult habits are established. Girls smoke less than boys, but by the age of 15 about 15 percent and by the age of 20, about 40 percent smoke regularly. It was also found that some children start smoking at the age of five and about one in three who become regular smokers began when they were nine.

REASONS FOR SMOKING

By children

There has been a considerable amount of psychological and social research into the problem why children smoke. Most of the research has centred round the period when children make their first attempts at smoking. In fact many children are becoming 'conditioned' almost from birth to the expectation that they will smoke. There are strong corre-

lations between children smoking, and the smoking habits of their parents and elder brothers. By the early teens children are in the stage of trying them out. Once adolescence is reached and influence of friends and acquaintances begins to assert itself. The youngster believes that the tougher, and more sexually advanced older teenagers smoke, but the most successful youngsters both in sport and books do not smoke. Also, the more comfortable and secure his circumstances and environment the less will a child need to find diversions such as smoking.

Youngsters are also influenced by the same social pressures as adults, and also by subtle and slanted advertisement to make them believe that tough and romantically successful people do in fact invariably smoke.

There is also an equally strong urge for girls to copy the boys of the same age group and so they too take to smoking.

By grown ups

It will be interesting to consider why people smoke. It is known that society by and large is made up of smokers. When a person visits, there are ash-trays provided, cigarettes are offered on the general assumption that people smoke. Even advertisers suggest that smoking is a normal thing, and that it is impossible to completely enjoy the pleasure of certain situations without a cigarette. Thus people follow the social pattern. Others smoke because it is a social habit. To offer and to accept cigarettes establishes a bond, and in this way it resembles food and drink. As such the smoker may smoke to be one of the company. Yet others do so merely for pleasure, for after sometimes initial coughing, nausea and even vomiting, most smokers get pleasure from the taste and aroma of tobacco smoke.

The majority of smokers claim that it sedates them, "settles my nerves" they would say, and also that it acts as a stimulant when they need to think and work. There is experimental evidence that these effects are due to nicotine and that both these claims are true, depending on the dose, on what the smoker is doing, and on his particular psychological and physical make up.

TOBACCO SMOKING IN SRI LANKA

Tobacco is used in this country for smoking as cigarettes, beedi, cigars dry and wet, and pipe, and also it is chewed with betel leaf.

Two distinct types of cigars are manufactured, the dry and the wet. The wet cigar which is smoked and sometimes chewed is used mainly by old people. This is actually going out of fashion. The cheroot is not commonly used. Really the cigar and

the cheroot will differ only in the finish.

The beedi consists of beedi tobacco mixture with a wrapper leaf to hold the contents. The wrapper leaf belongs to the diospyrus family.

Very little information is available about the prevalence of tobacco smoking among the general population. It has not been possible to determine to what extent the tobacco smoking habit has extended from urban areas to the rural population.

The information available is from limited surveys and studies carried out by scientific workers during the last twelve years.

(a) General Survey

In 1969 Urugoda and Senewiratne carried out a study in Kandy, which had a population of about 100,000. Theirs was a random sample survey utilising senior medical students. These students interviewed all inmates of 15 years and above in selected houses. A total 1,121 subjects were interviewed. Of these 48.2 percent of the males smoked, and only 1.6 females smoked. 90 percent of the smokers consumed cigarettes while the remainder smoked the beedi or cigar. People with a better education smoked cigarettes in preference to beedi and cheroots.

This study showed that the per capita consumption of tobacco, as well as the proportion of smokers, and the daily average number of cigarettes smoked by them was very low, compared to figures from the developed countries.

(b) Doctor's Survey

A further study was undertaken by Mendis in 1972 by using questionnaires to determine the smoking habits of medical doctors. 389 doctors responded to the questionnaires and of these 29.56 percent were smokers, 18 percent ex-smokers and 52 percent non smokers. It will be noted that 70.43 percent of medical men were non smokers.

It was noticed that 5 percent of the smokers were in the age group 40—45, and 28 percent in the age group 25—39, and only 15 percent over the age of 55 smoked. Most smokers were in the age group 45—49.

Even of the 29.56 percent of the smokers only 68 percent were regular smokers, and the others were occasional smokers. Of the smokers 74 percent smoked cigarettes, 47 percent smoked less than 10 cigarettes a day and 36 percent 11—20 cigarettes. Of the 185 smokers and ex-smokers 47 percent had started smoking between the ages of 20—24, and 22 percent between the ages 15 and 19.

The reasons of giving up smoking by the ex-smokers was that they had sufficient evidence that smoking was injurious to health.

(c) School Survey

To determine the smoking habits of School children Mendis in 1972/1973 surveyed school children in ten selected schools in the city of Colombo. She questioned 1186 children of the age group 5—20 years.

TABLE IV Age Distribution of Students Who Smoked Regularly

Present Age	Percent Regular Smokers
15	6
16	7.6
17	11.6
18	16.3
19	21.8
20	16.7

Of the 1186, 12 percent smoked regularly, 27 percent occasionally, and 45 percent never smoked. The earliest age of commencement of smoking was 5 years, and the mean age was 14.5 years. Most of the children smoked cigarettes. The regular smokers smoked 12 cigarette a week.

TAR AND NICOTINE CONTENT OF LOCAL CIGARETTES

The tar and nicotine content of different brands of local cigarettes as analysed by the Ceylon Tobacco Company is given in Table V.

The tar content of all brands of local cigarettes is high compared to 15 mg. for cigarettes allowed in some developed countries. The tar and nicotine content of cheaper cigarettes such as Three Roses is higher compared to the expensive brands such as Gold Leaf. Nicotine content of Golf Leaf brand was below 1 mg. while in Three Roses it was 1.5 mg. A nicotine content of over 1, mg. per cigarette may be considered excessive.

The Ceylon Tobacco Company has agreed to set up the necessary facilities for continuous analysis of tar and nicotine content of cigarettes.

ECONOMIC REVIEW, MAY 1982

TABLE V Tar and Nicotine Content in Milligrams per Cigarette of Local Brands

B R A N D	Tar Mg/Cig	Nicotine Mg/Cig.
Player's Gold Leaf	18.2	0.8
Matterhorn	20.4	1.2
Eristol	22.3	1.2
Four Aces	19.4	1.07
Capstan	24.0	1.1
Three Roses	22.5	1.5

The World Health Organisation is in the process of analysing the tar, nicotine and carbon monoxide content of cigarettes, both imported and locally manufactured. Five brands of each have been sent to Geneva.

DISEASE CAUSED BY TOBACCO SMOKING IN SRI LANKA

In Sri Lanka very few studies have been made to determine extent of disease caused by tobacco smoking. Some studies indicate a co-relation between smoking and lung cancer.

Studies in India have shown a higher incidence of cancer of the mouth, gullet and oesophagus in beedi smokers. Beedi smoke also has a higher concentration of carcinogenic substances. Heavy smoking also produces mutagenic urine. The mutagen causes, during pregnancy, birth defects and in young adults genetic diseases.

Cardiologists working in the cardiology unit at the General Hospital in Colombo have noted that cigarette smokers run the risk of dying from heart disease more than non smokers. A preliminary study was

undertaken to determine the smoking habits of patients admitted to the cardiology unit of the General Hospital. This was a retrospective study of patients admitted in 1974.

The data was collected from clinical notes. 100 cases notes were studied and it was found that 35 percent of the patients had been smokers at the time of admission to the Unit. Of these 63.1 percent had serious complications of coronary heart diseases, whereas only 45 percent of the non-smokers had complications.

A further study of 954 clinical records of patients admitted during 1979/1980 was undertaken by Sivayoham with financial assistance from the World Health Organization. The aim of this study was to determine the association of tobacco smoking and coronary heart disease. 51.4 percent of the 954 were smokers and 26 percent were non smokers. In the case of others there was no record of the tobacco smoking habit. 90 percent of the smokers smoked cigarettes. The E. C. G. findings showed that there was a significant increase in the incidence of myocardial infarction among smokers compared to non smokers.

Some cardiac complications such as ventricular rhythm and conduction defects were significantly greater in tobacco smokers than non smokers.

LEADING CAUSES OF MORTALITY IN SRI LANKA

The leading causes of death for the year 1966, 1973 and 1977 are shown in Table VI. There is a complete change in the mortality pattern during the last decade. Now Heart diseases are the chief cause of death.

TABLE VI Leading Causes of Mortality 1966, 1973, 1977 (Rate/100,000)

	1966		1973		1977	
	Rate	Rank	Rate	Rank	Rate	Rank
1. Heart diseases	60.2	3	68.5	1	98.4	1
2. Respiratory diseases	53.0	4	64.0	2	93.3	2
3. Accidents and Suicide	46.7	5	61.8	3	90.3	3
4. Diarrhoeal diseases	79.3	2	51.5	5	81.2	4
5. Diseases of Infancy and Immaturity	99.6	1	58.4	4	67.9	5
6. Malignancies	26.7	7	31.8	7	38.7	7
7. Anaemia and Malnutrition	38.7	6	38.9	6	42.1	6
8. Other infections	20.8	8	15.9	8	17.9	8

DIAGRAM III: Mortality of Heart diseases and Malignancies in 1966, 1973 and 1977.

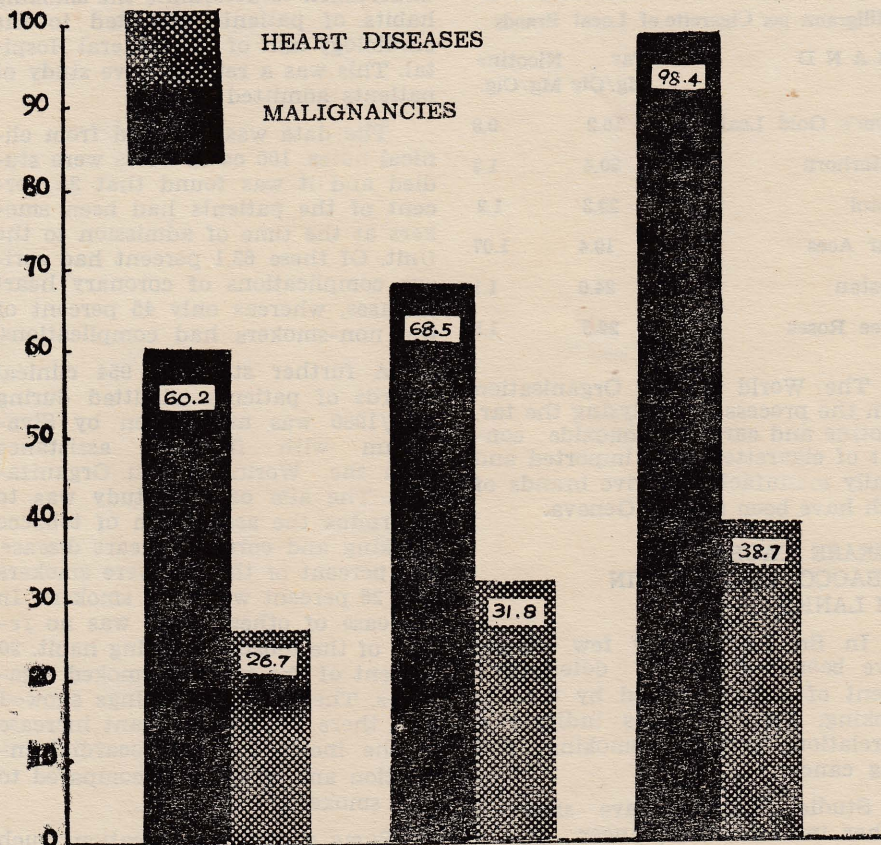


Diagram III shows the relative increase in mortality for heart disease and cancer. Tobacco smoking increases death from both these causes.

TOBACCO REVENUES

Sri Lanka's revenue from tobacco by years is shown in Table VII. The revenue has increased by over four times since 1971/1972 to 1981 from 247.7 million in 1971/1972 to an estimated Rs. 1,040 million in 1981.

Year	Revenue in Rs. Million
1970 — 71	247.7
1971 — 72	391.7
1973	341.5
1974	372.9
1975	459.3
1976	451.7
1977	591.0
1978	758.6
1979	800.7
1980	999.7
1981	

The annual tobacco excise duty generates a tidy sum as revenue. It is more than the annual expenditure on the Health Services. Consequently Government is reluctant to reduce this revenue. The rationality of this policy has been questioned as a fair proportion of this revenue is spent on tobacco produced diseases.

In the United Kingdom the annual expenditure on smoking related diseases at present is 155 millions pounds sterling.

SOCIO ECONOMIC IMPLICATIONS OF TOBACCO

- (1) Smoking control measures should primarily be undertaken because of the deleterious health consequences of smoking. However, the economic losses lend support to the desirability of smoking control. The average smoker smokes about 20 cigarettes a day. Taking the cost of a packet of 10 Bristol cigarettes at Rs. 5.50 the monthly savings of a person giving up smoking would be about Rs. 330/-. For a year this would amount to over Rs. 3,760/- and for five years with interest it could amount to about Rs. 26,000/-.
- (2) The collection of tobacco revenues offers no justification for delaying the implementation of measures to reduce smoking.

The Mechanisms by which Economics of Society

The health-damaging effects of smoking give rise to a reduction of the working capacity of the population and to an extra demand for medical care. Both these circumstances mean that smoking constitutes a burden to the economics of the society.

Among smokers there are more deaths before retiring age than among non-smokers. Every such death means that there is loss in production thereby effecting the total production of the nation.

There is more severe disablement occurring among smokers than non-smokers. Similarly there is a greater incidence of illness among smokers. Smoking may be a contributory factor in aggravating other illnesses such as respiratory diseases. All these contribute to loss in production with consequent economic effects.

The total value of goods and services produced in a country is generally referred to as the Gross National Product (GNP). Consequently, smoking causes a reduction of the GNP by decreasing the number of work-days that are actually performed in

- (3) There are indications that taxation could be used as a tool for curtailing or modifying tobacco consumption.
- (4) The world tobacco economy is dominated by a few large companies whose combined advertising budgets total about US 200 million.
- (5) Tobacco production is seldom genuinely profitable for the country concerned or for individual farmers and workers and can lead to economically important negative consequences for food production.
- (6) The substitution of other crops for tobacco is a vital factor in implementing smoking control in tobacco-growing countries.

STRATEGY FOR SMOKING CONTROL

Objectives —

- (a) Achievement of lower smoking rates in all age groups of the population. This implies the application of whatever downward pressures on smoking rates that are practical. These might include health warnings on packets, taxation manipulation, restrictions on smoking opportunities, encouragement of the rights of the non-smoker, as well as measures such as are involved in political, publicity and education programmes.

ECONOMIC REVIEW, MAY 1982.

Smoking Impairs the

--- W. A. Karunaratne M.D.

the country. According to a Swedish study (Jonsson 1974), the greater part of the loss of production is due to premature deaths, this category representing about half the loss of production while disablement and hyper-morbidity each represent about a fourth of the total loss of production.

The illnesses related to smoking not only effect work-days, but also make it necessary to spend extra large parts of the total economic assets of the society on medical care. Most of the assets that are spent this way might otherwise be used to supply other kinds of welfare. Therefore, this smoking-related extra demand for medical care, constitutes another burden on the economics of the society. The category of costs involved in this connection are hospital and out-patient care and medications. However, these costs represent only the smaller part of the total burden posed by smoking on the economics of that society. The value of the loss of production represents an amount of money that is several times greater than the extra medical care costs.

In addition to the loss of production and the extra costs for medical care, there are other categories of smoking-related costs to the economics of the society, such as the need for increased ventilation in buildings used by smokers. This means higher building and maintenance costs.

Finally, there are a few points to be noted about tobacco revenues. It is sometimes said that revenues would, at least partially, compensate for the unfavourable effects of smoking on the economics of the society. This view is a misconception since no taxation system whatsoever can have the power to re-create lost work-days or make an actual need for medical care unnecessary. (Linholm 1974).

In order to understand the role of tobacco revenues we have to distinguish between two things. First, there is the national budget which is a balance between national supply of assets (national production i.e. the GNP) and national use of assets (private and public consumption — private and public investment). Secondly, there is the government budget which is a balance between income and expenditure in the business of the governments administration.

Smoking has an unfavourable effect on the first balance, since the reduction of GNP due to smoking reduces the scope for consumption and investment. Tobacco revenues in this balance represent just a transfer of money, not a creation of new assets. By maintaining the distinction bet-

ween these two balances we can also more easily recognize that the rather technical sort of benefits of tobacco revenues in the government budget could not be taken as an acceptable excuse for ignoring the need for each government funded smoking control action that represents the only way to reduce those ill-effects on the economics of the society which are connected to the national budget.

Effects of a Reduction in Smoking on the Economics of the Society

When speaking of the benefits of reduced smoking, the health benefits, namely human values of health and wellbeing, should be considered the primary ones, and these cannot be expressed in terms of money. A reduction in smoking will also yield benefits to the economics of the society, namely benefits that are expressed in terms of money. Therefore, it will be possible to make comparison in terms of money between the economic value of the possible benefits and the costs of such smoking control action that can accomplish these benefits.

A study in the United Kingdom to calculate the effect of reduction in smoking in terms of improved labour capability of the population and the potential to the GNP, that might be the result of reduced premature death and reduced absence from work due to smoking related diseases, show that a 20% reduction in smoking will in 1981 repre-

sent an addition to the GNP of £.42 million and by 1991 £.84 million. A 40% reduction of smoking would have given in 1981 an addition of £84 million to the GNP and £ 168 Pounds million in 1991.

Overview

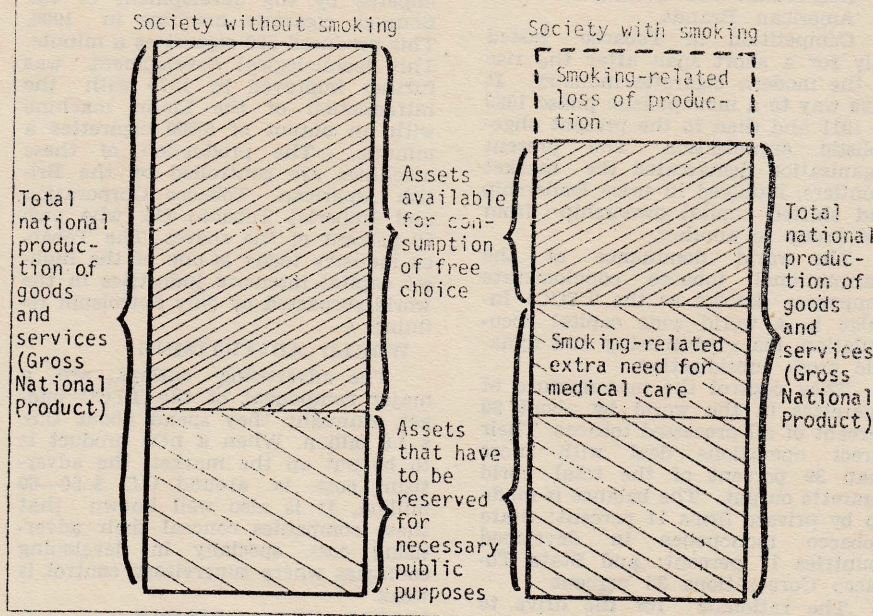
The major effects of smoking on the economics of the society are illustrated in Figure 1.— The two boxes represent the same society. The left one of the boxes represents the (hypothetical) case that there were no smoking, the right one the (actual) case where some part of the population is smoking.

Comparing the two boxes one finds first of all that the Gross National Product is reduced in the society where smoking occurs.

In both cases part of the assets represented by the GNP has to be used for necessary public purposes, such basic health care and education. In the smoking society these necessities cost more than in the non-smoking one.

"A door might be opened to serious difficulties" the specialists fear, "if tobacco consumption were allowed to grow without control in the relatively new markets of the Third World, where the powerful tobacco companies have a free hand... In the long run, the economy of the developing countries will be negatively affected, besides the health of their populations, if they start relying on tobacco production as a source of revenue".

FIGURE 1
Effects of smoking on the economics of the society



N.B. The various sections of the boxes in Figure 1 are not drawn so that their areas reflect the true proportions between the corresponding amounts of economic assets.

- (b) The encouragement of non-smokers to remain non-smokers. The emphasis of this programme is on youth.
- (c) The cessation of all forms of tobacco promotion.
- (d) Those who have not yet stopped smoking, and therefore remain at high risk should be encouraged to reduce, as far as possible, their exposure to harmful components of tobacco smoke.
- (e) To maintain liaison with other health organisations and authorities to ensure maximum effectiveness and avoid conflict of activities.
- (f) To achieve public health control of relevant industrial and environmental factors which contribute to lung cancer.

EDUCATION ON SMOKING

Public information and public education programmes are two separate

essential components of a smoking control programme that are mutually complementary.

Education on smoking must as a general principle be integrated with Health Education programmes.

Even some Governments have found it useful to establish national smoking and health agencies to devise and implement smoking control programmes.

Objectives would be to:

- (1) Illustrate the justification for smoking control action.
 - (a) Make the public aware of the consequences of smoking for the health of the individual smoker.
 - (b) Make decision-makers aware of the consequences of smoking for public health and the environment.
- (2) Prevent the onset of smoking.
 - (a) Reduce pro-smoking influences.

(b) Strengthen individual resistance to pro-smoking influences.

(c) Increase the attractiveness of non-smoking.

(3) Change smoking behaviour.

(a) Induce smokers to perceive smoking as an important and personally relevant health risk.

(b) Persuade smokers of the health benefits of stopping smoking.

(c) Convince smokers that stopping is not impossible.

(d) Induce smokers to make an actual change in their smoking habits, such as stopping or at least reducing their exposure.

(e) Prevent relapse.

(4) Establish a social climate oriented towards non-smoking

(a) Create a general awareness of non smoking as the natural behaviour in social life.

CONTROL OF TOBACCO MARKET BY SEVEN SMOKING SISTERS

The Tobacco market is an oligopoly which means that it is one dominated by a very small number of firms which have become more intricately involved with other commodity sectors in the world market. The combine of the seven sisters comparable to the oil majors are:

British American Tobacco (Bat)
Imperial Tobacco Co.
Phillip Morris
Gulf and Western
R. J. Reynolds
Rambrandt and Rothmans Group
American Brands.

Competition in Tobacco lasted only for a short span after the rise of the modern cigarette industry. It gave way to a monopolistic phase 1880 — 1911 and then to the present oligopolistic organisation. The present organisation demarcated the market frontiers, indulged in price leadership and shifted capital ownership from one group to another.

The world dominance of the transnational tobacco conglomerate companies (known as the TTCC) indulge in a world wide capital accumulation, mass advertising and dynamic cross subsidisation.

They control the manufacture of cigarettes in the world by about 90 percent of all processed tobacco. Their direct operations deal with more than 39 percent of the total world cigarette output. The balance is made up by private firms 11 percent; State Tobacco monopolies in developed countries 17 percent; and State Tobacco Corporations 33 percent.

The rationale for the drive to monopolistic competition was because of excessive competition which narrowed profits through the pressure of lower price of the competitors, and also such monopolies enabled the in-

crease of profits by various economies that they could effect. The first was the birth of the American Company in 1890. This continued its monopolistic activities till the birth of British American Tobacco (Bat) in 1902, which laid the foundation of the world tobacco oligopoly.

The Sri Lanka Tobacco Company is controlled by the British American Tobacco.

CIGARETTE MACHINES

The industry was given a huge impetus by the development of the Bonsack cigarette machine in 1900. This produced 500 cigarettes a minute. This technological development was further improved by 1976 with the introduction of the Molin machine with an output of 5,000 cigarettes a minute. The production of these machines are controlled by the British American Tobacco Corporation and Imperial Tobacco Co. who own 50 percent of the shares. The Tobacco industry today is one of the highest capital intensive industries in the world surpassed by only Petroleum refining.

WORLD ADVERTISING

The advertising outlays are a major component of the TTCC budget. Annually they spend about U.S. \$ 1.8 billion. When a new product is to be put on the market, the advertising cost is around U.S. \$ 50—60 million. It is also well known that these companies conceal their advertising cost, specially in developing countries where supervisory control is weak.

WORLD WIDE BRIBERY

It was disclosed by one Company's affiliate that it hands "pay offs" to all major political parties and specially the party that is governing

a country. These "pay offs" are said to be necessary for the survival of the Corporations, making the biggest profits as well as to get favourable legislation enacted. It has been disclosed that over a period of the five years from 1970 — 1975 one Company paid U.S. \$ 19 millions as illegal "pay offs". It has also used other funds to influence congressional and presidential candidates in the U.S.A.

CROSS SUBSIDISATION

The present policy of these tobacco combines is to cross subsidise other industries thereby diversifying their capital investment. Sums involved in this direction have been staggering e.g. Reynolds took over Delmonte Corporation at a cost of U.S. \$ 621 million.

Then to enter into the World shipping market for Tobacco, the Sea Land Services, the worlds largest containerised freight operations was taken over by the Tobacco Companies at a cost of U.S. \$ 530 million. Similarly, they took over the American Independent Oil Company to ensure lower fuel prices. The need for diversification arose as the Tobacco Companies had huge sums of money available for investment.

TOBACCO ECONOMY

The World Tobacco economy has been moulded and fashioned by the dominance of a few Tobacco companies. At all stages of production and marketing a handful of giant corporations, whose epicentres of power remain in the United States, the United Kingdom and South Africa, exercise decisive control. The tobacco industry now straddles, through cross-subsidisation, the centre spectrum of modern business and plantation agriculture.

- (b) Create a widespread understanding of the need to establish non-smoking environments in public places and at places of work.
- (ii) Design of Programme — in designing an educational Programme factors such as the following should be kept in mind.
- risk of serious disease.
 - effect of smoking on general physical fitness.
 - risk of frequent incapacity from illnesses such as chronic bronchitis and cough.
 - economic costs of smoking.
 - responsibility to dependants and others.
 - displacement of smoking as a status symbol in opposition to the efforts of the tobacco industry to establish smoking as a symbol of social success.
 - pollution of the atmosphere by tobacco smoke (eg. the rights of the non-smoker).
 - waste of resources represented by tobacco production, including the waste of agricultural land.
 - special risk of smoking to those engaged in certain occupations.

It is essential to realise that the majority of people are still unaware of the widespread harmful effects of tobacco smoking. They do not know that smoking is a dangerous hazard, that shortens lives, kills and disables people, smells foul, creates a litter problem, pollutes the air, costs a lot of money which literally goes up in smoke, and is deeply offensive to around fifty percent of the people.

It is of paramount importance to take decisive action to curb the increasing use of tobacco, especially of cigarettes in order to safeguard the health of the people. Efforts to combat it must stand much higher than now in national priorities for preventive medicine. Far more determined efforts must be made by the Government, the health-caring professions, trade unions, teachers and individuals to discourage this habit.

The united voice of leading British doctors calls for drastic action on the grim forecast of dramatic increase in deaths from lung cancer and coronary heart disease unless there is a change in smoking habits.

Steps taken so far by successive Governments to decrease tobacco consumption have remained paltry and hesitant. Total prohibition of a habit on which so many people were dependent would be mis-guided because it would lead to evasion with consequences as grave as the prohibition of alcohol in the United States of America and parts of India. But legislative measures would be desirable to discourage children from starting to smoke and to help all smokers who would like to stop it.

It should be much easier to ensure that children do not begin to smoke, than to persuade adults to stop. Teachers should be instructed in training colleagues how to discourage children, and they should abstain from smoking as an example. Shopkeeper's should be prohibited from selling cigarettes to children. Doctors should ask all patients about their smoking habits and warn them of the dangers and set an example. It is unfortunate that any doctor should continue to smoke in public. No smoking should be the normal practice in hospital wards for the actual ill.

Smoking in Hospitals

A hospital is a place where smoking is particularly inappropriate, and the general attitude towards it should therefore be one of discouragement. On the other hand, a complete ban will not usually be practicable. Smoking by out-patients and those accompanying them should be generally forbidden, except possibly where a canteen is separated from the waiting area and is adequately ventilated. In-patients should not be encouraged to smoke. Those whose condition would be made worse by smoking should be firmly discouraged. If smoking is allowed at all, it might be limited to day rooms or particular wards (or perhaps if no other space is available, to parts of a ward) and to particular times of day.

Smoking by any of the staff should be forbidden in any treatment areas, kitchens and food preparation rooms. Apart from this, the example set by staff, especially medical and nursing staff, is of particular importance. It is therefore undesirable that staff should smoke in any part of the hospital open to patients or the public.

Doctors and Patients

There are good medical reasons for advising patients with bronchitis, peptic ulcers and heart disease to stop smoking. Even a smoker's cough may be an indication that the habit should be given up. If the doctors do not smoke themselves, they will be in a better position to help their patients. Doctors and medicalmen have a responsibility for public education about the dangers of smoking.

Action by International and National Organizations and Governments

Governments of many political hues subsidize tobacco production and consumers the world over spend an astounding \$85 to \$100 billion each year to buy four trillion cigarettes.

Although many governments, particularly in developed countries, have recently adopted a variety of anti-smoking policies, still more have done little or nothing to discourage cigarette use.

How is that such a harmful product has become so firmly entrenched in daily life the world over? Why does tobacco occupy good farmland in India while peasants starve nearby?

For the last several years the World Health Organisation was concerned "about the alarming world wide trends in smoking related mortality and morbidity, and the rapidly increasing consumption of tobacco." It decided that "an effective strategy to tackle the problem" required "concerted effort consisting of education, restrictive and legislative measures, combined with coherent taxation and price policies." Accordingly, the World Health Organisation recommended to the Government of member states, including Sri Lanka, in 1976:-

- to create and to develop effective machinery to coordinate and supervise programmes for control and prevention of smoking on a planned, continuous and long-term basis;
- to strengthen health education concerning smoking as a part of general health education and through close collaboration with health and school authorities, mass media, voluntary organisations, employers' and employees' organisations and other relevant agencies;
- to consider steps which can be taken towards ensuring that non-smokers receive protection, to which they are entitled, from an environment polluted by tobacco smoke;
- to give serious consideration to legislative and other measures.

Several countries such as Australia, Belgium, Canada, Bulgaria, Czechoslovakia, France, Israel, Kuwait, Malaysia, the Netherlands, New Zealand, Romania and the United States of America have taken or are planning to adopt suitable measures.

Cessation Programme

Cessation programmes to help heavy smokers who are determined to give up smoking have been successfully carried out in various countries in the world. The essential ingredient to success is that the smoker must make up his or her mind to give up smoking. The cessation programmes could only assist them. Unfortunately in this country non smoking clinics or clinics to assist heavy smokers to give up smoking are not developed nor has the Government established clinics to help such victims.

In other countries where group therapy cessation programmes have been established, therapy consists of a group meeting with a therapist for about two hours, twice a week, for about four weeks.

TABLE IX Growing Turnover and Profits in Tobacco

Year	Ceylon Tobacco Company's Financial Operations (Rs. million)		
	Taxation	Profit before Taxation	Profit after Taxation
1976		41.0	11.9
1977	893.8	42.4	13.1
1978	1,059.4	48.0	15.2
1979	1,221	47.1	24.4
1980	1,963.4	60.7	32.5
1981	2,482.2	75.1	42.6

A breakdown of the Tobacco Company's contribution to Government Revenue is given in table VII and is therefore not included here. In the Annual Report for 1978 the Chairman of the Company states that company taxation accounted that year for 68 per cent of trading profits or 83 per cent of Company revenue which amounted to Rs. 375 million. Despite the imposition by Government of heavy taxation consumer demand for products continued to grow. More recently other factors have also contributed to higher prices of cigarettes. But, according to the Company's 1981 report, despite the higher retail prices, total sales of the Company's products registered a further increase. More modern cigarette making machinery has been installed; new products were launched and the Company has plans for introducing more brands of cigarettes to widen its product range.

Source: *Ceylon Tobacco Company-Annual Reports*

There have also been doctors taking a personal interest in advising patients to stop smoking by giving lectures, film shows and group discussions.

In some countries hypnosis and drug therapy have been successfully carried out to enable heavy smokers to stop smoking.

In Sri Lanka what is available to such people are counselling by doctors, acupuncture and 5 day group therapy smoking cessation programmes. A chewing gum containing nicotine has been used successfully in many countries, including Sri Lanka.

Sri Lanka National Federation on Smoking and Health

To combat the dangers of smoking and to promote good health through the control and prevention of smoking, the Sri Lanka National Federation on Smoking and Health was formed in October 1976. It consists of affiliated organisations such as:-

1. Sri Lanka Cancer Society.
2. Samma Ajiva Samajaya.
3. Sri Lanka Medical Association.
4. Ceylon National Association for the Prevention of Tuberculosis.
5. College of Ayurvedic Medicine.
6. Lanka Jatika Sarvodaya Shramadana Sangamaya.
7. All Ceylon Public Transport Travellers' Federation.
8. Sri Lanka Consumers' and Users' Federation.
9. International Temperance Association.
10. Centre for Society and Religion.
11. Sri Lanka Association of Community Medicine.

and Representatives of Ministries such as Health and Education, and individual members.

The Patron of the Federation is His Excellency the President of Sri Lanka. The Vice Patrons are Ministers of Health and Education. The Federation is an Approved Charity, so that tax relief is granted on contributions to the Federation.

It is the view of "The Sri Lanka National Federation on Smoking and Health" that the State as a matter of national policy should adopt preventive measures against smoking. As a result of the representations made by the Federation, the State has implemented or is implementing the following:-

- (a) The Ministry of Health has decided to adopt measures for more effective education of the public, particularly school children, as regards the dangers of smoking. If parents and teachers refrain from smoking in front of children, or better still, give it up altogether, it would be a worthy example to them.
- (b) The Cabinet decided to ban tobacco advertising on the T.V. net work and the Radio.
- (c) The Ministry of Trade has enforced the printing of Health warnings in Sinhala, English and Tamil on Packets of cigarettes.
- (d) Local authorities have taken action to prohibit smoking in public places such as Theatres and Cinemas.
- (e) The Ceylon Transport Board is enforcing non-smoking in buses.
- (f) Air Lanka has reserved a section of the aircraft for non-smokers.
- (g) Legislation to compel tobacco companies to declare the nicotine and tar content of the different brands of cigarettes.

Committee on 'Action on Tobacco and Health'

The Minister of Health has appointed a Committee to advise him on the various programmes to be initiated and implemented so as to arrest the smoking epidemic.

The Committee consists of representatives of the Ministry and Department of Health, the Cancer Society, the National Federation on Smoking and Health and the Medical Association. The Chairman is the Director of Health Services.

The Committee will carry out its work through the sub-committees on Education, Information Surveillance, Legislation and Socio economic implications.

Further Action to be taken by Government

- (a) Provision of non smoking compartment in Trains.
 - (b) Carry out more effective education of the public particularly school children on the dangers of smoking.
 - (c) Promote the establishment of anti-smoking clinics to help those who have difficulty in giving up smoking.
 - (d) Prohibit smoking in all out-patients departments, treatment areas and kitchens of medical institutions.
 - (e) Encourage by subsidies the cultivation of alternate crops to tobacco which could be more useful and profitable to the community. Consequently the Tobacco Corporation which produces annually over a million kilogram of Tobacco will have no place in the economy of Sri Lanka.
 - (f) Promulgate legislation to —
 - (i) Prohibit smoking in offices as was the practice under British Administration and in all work places.
 - (ii) prohibit tobacco companies sponsoring sports events.
 - (iii) tobacco advertising in the Press and in public places.
 - (iv) sale of tobacco and tobacco products to Minors.
 - (v) importation of journals with advertisement on tobacco without the health warning.
 - (g) Request Cabinet Ministers and members of the National State Assembly to set an example by refraining from smoking in public.
- It has been established that tobacco smoking, especially cigarette smoking, is on the increase in Sri Lanka and also it has been proved that this habit causes widespread injury to health. It is therefore argued that since the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being, it is the paramount duty of a Government and enlightened people to adopt measures to curb any such dangers to the health and well being of the people.

Lessons from Water Scarcity in the Mahaweli Settlements during the 1981-82 Maha Season

A major objective of the Mahaweli Irrigation Project through the building of dams, reservoirs, tunnels and channels, was to provide irrigation water to the settlers. However, the water distribution and on farm water management has remained a crucial issue from the inception of the settlement programme. Although the settlers were assured of irrigation water for both Yala and Maha seasons, they are not allowed either to use irrigation water independently or to cultivate the crops of their choice because of the limited water in the reservoirs. Firm decisions were taken by the management regarding the crop to be cultivated and the amount of irrigation water to be used by the settlers, specially during Yala season. Therefore, almost every Yala season the farmers have been discouraged from cultivating paddy because the usual water supply was insufficient. The cultivation of paddy in selected areas of the H system was prohibited. Farmers were forced to cultivate subsidiary food crops mainly because of the limited water in the reservoirs.

The Maha season, on the other hand, was more favourable to the settlers as far as the water supply was concerned. Cultivation practices of paddy have therefore kept improving every Maha Season from about 1976; when the risk of irrigation water has been found to be at a minimum and when the certainty of Monsoon rain was considered. Yield from the System "H" has tended upwards from 1976/77 with the Mahaweli diversion. As the Maha paddy cultivation in the past was satisfactory the beginning of 1981/82 Maha season (latest) also recorded a satisfactory progress of the cultivation process. For example, the highest extent was cultivated and a large volume of credit was disbursed, according to the commercial banks' records. More settlers transplanted and fertilized. New areas of the System H were also brought under cultivation. However, the water level of the Kalawewa Reservoir began to decrease at the end of January 1982; due to absence of usual rainfall both in the catchment and settlement area. During this year's Maha season the Kalawewa held only about one tenth of its full storage and was dropping at the rate of 3 inches per day, according to official reports. By this time the majority of settlers were reaching the final stages of their

water requirements, for their paddy crops. More than 90 per cent of the paddy cultivation reported lost due to drought, within the Kalawewa area of the Mahaweli Settlements could have been saved, if the water supply could have been continued until the middle of March, as the management had agreed at cultivation committee meetings. Unfortunately, water was available only until the end of January 1982, according to official estimates.

STRUGGLE FOR WATER

There arose a struggle for irrigation water with the announcement of a water scarcity in the Kalawewa Reservoir for further distribution during the last week of January 1982. Disputes for water amongst settlers, and conflicts among the tail-enders and those in the head reaches of the distributory channels and main channels were difficult to control by the management. As there was no alternative, a decision was taken to close the gates of the main channels at Kalawewa Reservoir, accept the Jaya Ganga. The intention was to at least save the available water for the most successful areas of cultivation. This decision, however, led to unrest among the settlers in Kalawewa area where the water supply was stopped, particularly at Kalawewa and the Galnewa townships. Officials were helpless in this situation and the matter had to be referred to higher political authorities before the settlers succeeded in getting the gates of the main channels reopened. However, the problems of scarcity of water grew worse when the water level of the Kalawewa Reservoir decreased within a short period.

Groups of settlers at the lower parts of the distributory channels organised themselves to resist attempts by those at the headreaches to retain whatever water was left as they blocked the main channels near the very gates of their distributory channels. Some settlers who benefitted from the main channel on Balatuwewa side of the Kalawewa Reservoir collectively built a dam with sand bags to prevent water flowing into the Kalawewa side. Meanwhile, another group of settlers, near the Kalawewa left bank channel, organised themselves to clear the mud between the middle of Kalawewa and their main gates. The struggle for

water was intense as the majority of settlers required only two duties of water to save their crops. Most of the settlers at the lower part of the distributory channels within the regions of Galnewa (H1) and Meegallewa (H2) which includes Kalankutiya organised their own groups at hamlet level and all those groups also attempted to form their own area organisations in order to press their demands collectively. They also were now thinking of compensation for the crop failure, rescheduling of bank credit, subsistence support until next Maha season etc. However, another group of settlers at the upper part of the main channel did not cooperate with them as they were in a position to draw on the little water that was left. Many individuals resorted to their own means for drawing the last two duties of water, such as through pumping from drainage channels and nearby small tanks. Water pump and tractor owners used this opportunity to increase their charges. The charges for a 2 inch motor pump went upto about Rs. 40/00 to Rs. 50/00 per hour during this period.

A significant attitude noted among the majority of the settlers in the Kalawewa settlement area was that earlier they were ready to accept drought as quite a natural course in their cultivation lives. They were used to it during their purana village days and took it for granted. But now the same settlers under Mahaweli settlement often looked at the drought situation of 1981/82 Maha as "mismanagement of water" by an outside bureaucracy. Some of the settlers viewed the situation, not as a misuse of water by settlers, but as misuse of water by few people through political influence. There appeared to be a strong feeling of a close link between politics and irrigation water in this large scale irrigation scheme. It was only natural that the settlers were disgruntled and were looking for 'scapegoats'. Nearly 40 percent of this 'H' system was damaged by drought.

According to official estimates "of the total cultivable area in System 'H' inclusive of Rajangane and Kagama — Kattiyawa which are also in the Kala Oya basin, encompassing a total extent of 95,000 acres, the extent seriously affected by the drought stands at 38,160 acres; of this extent it has been possible to salvage the cultivations in respect of 5,830 acres. In other words the drought ravaged extent is 32,300 acres which is 34% of the whole of System 'H'". The worst damage is in Meegallewa (H2) which includes Kalankutiya, where it is feared the crop damage will be as high as 80%.

IMPACT ON THE FUTURE

The scarcity of irrigation water within the Mahaweli settlement area during 1981/82 Maha season could be considered an important stage in

the development and progress of this irrigation project because of its possibility of a far reaching impact on the future cultivation process and settlement policy.

- (a) It gave the settlers an opportunity to assess the need of collective forms of action. Many began to realise that the problems of cultivation were not confined to the boundaries of only their individual plots. They organised their own groups in most of the hamlets within a short space of two days.
- (b) The management will face greater difficulties in introducing better cultivation time schedules and cropping systems as the settlers crop and time schedules will tend to be based more on their own experience rather than the schedules of the management. For instance, cultivation of paddy during Yala (instead of subsidiary crops) and cultivation of short varieties of paddy during Maha seasons are likely to increase.
- (c) Indebtedness, malnutrition and sickness, and general discontent, specially amongst the low income group of settler, could increase in future, if effective preventive measures were not taken soon.
- (d) Due to lack of capital and low incomes and uncertainties there were possibilities of increased rent lease or 'share cultivation' during the next Yala season, which would weaken the situation in the following Maha season.
- (e) Recovery of institutional credit will be a serious problem and the credit performance might be weakened again. If a decision is taken to reschedule loans of defaulters, not only will future recovery rates decrease but discipline may be disrupted in the institutional credit system.
- (f) Settlers have begun to realize the importance and value of irrigation water and the need to improve irrigation water use practices. The management could use this opportunity to improve water management by obtaining the full co-operation of the settlers.
- (g) Regular cultivation of allotments cannot be expected from the majority of low income group settlers, without additional sources of income, specially during off-seasons. Therefore, it is important to identify and promote family level industries and other forms of self-employment during off-seasons.

TOURISM

The Case for High Cost, Low Density, Tourism

Two recent features of Sri Lankan Tourism that have been drawing some attention are the slackening of the tourist arrivals growth rate and the drop in the occupancy rate of graded hotels. Some aspects of these phenomena were discussed in the February issue of the Economic Review with the data available upto December 1981. Data for the first quarter of 1982 are still not released to monitor the trends. In the meantime it would be useful to examine some of the policy implications in these trends of dropping tourist growth rate and occupancy of graded hotels. One need not be alarmed by these trends and may even visualize turning them into some positive use by a policy of "low density, high cost tourism". In this it is useful to review at length the experience of Bhutan which has consistently gone in for this type of tourism.

Bhutan opened up for tourism in the early '70s but with a very strict policy that Bhutan is not for everyone. Bhutan's bureaucracy planned it so, right from the inception. Low density, high cost tourism was the guiding principle. Neighbouring Nepal's experience made Bhutan aware of the dangers of mass tourism for both the social and natural ecology. It was also possible by high cost tourism to bring in almost the same economic benefits as mass tourism. Indeed this approach and its success has now earned Bhutan a reputation for good tourist planning, balancing economic and social aspects. Valene L. Smith in a paper titled "Anthropology and Tourism — A Science-Industry Evaluation" had this to state of Bhutan's tourism:

"To demonstrate the relationship between host and donor region, a well-defined, spatially bounded tourist region whose cultural configuration is understood could then be marketed to a specific segment of a donor population to achieve a pattern of tourism that is mutually satisfactory to the touring and the toured. Bhutan is a notable case in point. When the local government decided to open the country to tourism in 1974, Bhutanese profited from the experience of nearby Nepal and determined to keep the visitor flow carefully controlled. They instituted stringent visa requirements and exceptionally expensive per diem rate, accepted only small groups of touring co-nationals (and no individual travellers), opened only three towns (aside from the border crossing) to outsiders, and maintained cultural

boundaries by using hotels situated some distance from Bhutanese farms and nuclear centres. By these restrictions, the Bhutanese selected an affluent, educated clientele and in 1979 only 2000 visitors were admitted, adding a substantial equivalent of US\$ 2,000,000 (mostly dollars, Deutsch marks and yen) to the national budget. Government officials, pleased with their planning, do not expect to increase the number of tourists; they prefer to preserve cultural integrity, and those who have visited the region deem a sojourn there one of the most pleasant visitor experiences to obtain anywhere". (1).

While this academic evaluation of tourism in Bhutan uncovers positive aspects of such tourist planning, the tourist themselves seem to appreciate this type of tourist experience. The following extracts from an article which appeared in a *New York Times* of Nov. 16, 1980 supports this.

"Quite simply, Bhutan is not for everyone, and the enthusiastic Western-trained young people who make up its bureaucracy want to keep it that way. "Low density, high-cost" tourism is the goal. Although the country has been open to tourists for less than a decade, the Government is aware of the dangers that mass tourism poses The young king, Jigme Singhi Wangchuk, leans back against the leopard-skin upholstery in his gilded throne room and tells visitors that the country's "gross national happiness" should not be sacrificed in the pursuit of a greater gross national product

There were no beggars; the people by the roadside looked us in the eye and smiled. Children approached and offered us blossoms. Everywhere we looked there were prayer flags proclaiming with each flutter the "ommani padme hum," the basic mantra of Buddhism that loosely translates as the "jewel in the lotus". Roadside shrines were bedecked with prayer wheels and bells and kites. By a stand of pine trees a sign erected by the forestry department quoted Lord Buddha: "The forest is a peculiar organisation of nature that makes no demands for its sustenance and extends protection to all beings, offering shade even to the axeman who destroys it".

There are two government hotels in Thimbu, both set on a ridge overlooking the capital. Both are new and comfortable and are built of whitewashed stucco with the traditional highly ornamented window frames — orange dragons with bulging eyes and flower petals and demons are among the repeated motifs. The rooms, which have all the comforts including a useful electric heater, are furnished with more dragon-bedizened furniture. The food is Western or Indian, mostly bland and with a good deal of rice and mixed vegetables in the Chinese style, filling and reasonable rather than memora-

ble. There are few taxis and it is a walk of about a mile to the main street

At one farmhouse near Punakha an old man sought to sell us a magical wooden bowl. He explained that it was made from a growth on a particular kind of tree that could be found only at night because it glowed in the dark. This bowl, he said, would glow and warn its owner if poison were put into it. I did not believe the story but I believed that the man offering the cup did. When he asked more than \$100 for it, I knew he was reflecting an indigenous rather than a tourist value system.

And that ultimately is the charm of Bhutan — there is an indigenous system of values. Bhutan has learned from the experience of Nepal, which issued its first tourist visas only 22 years ago. The more populous mountain country chose mass tourism; the hippies came and still come and planes daily disgorge large package tours. You can fly in a small plane around the slopes of Everest in the morning and play blackjack at a casino at night. There are French, Italian and Japanese restaurants.....

So far, the only foreign intrusions into Bhutan are limited to Thimbu. There is, in addition to a daily basket ball game, a Swiss bakery that was started by a technician who arrived 15 years ago as an advisor to the radio station, and a tavern called the Attic, which was opened by two students who returned from studying in India". (2)

The significance of the differential thrust in tourism planning between Sri Lanka and Bhutan is seen in the fact that while Bhutan earned US\$ 2m from a mere 2000 tourists in 1979, (US\$ 1,000 per tourist), Sri Lanka in 1979 earned an estimated US\$ 77 m from 250,164 tourists (US\$ 310 per tourist). No doubt in absolute terms the gross foreign exchange earnings were higher in Sri Lanka, but the cost of the infrastructure required to attract and service 250,000 tourist arrivals is also considerable. The Bhutan type of tourism as suggested by the writer in the New Times perhaps does not involve much foreign exchange, so that the nett foreign exchange earnings may also be higher than in Sri Lanka.

One must also bear in mind that Bhutan has earned US\$ 1000/-- per tourist arrival keeping the low density of tourist to the domestic population at 1:500, while for Sri Lanka in 1979 it was 1:56. (It is now in the range of 1:35).

It is also clear that the Bhutan Government has had tight ownership and control of the tourist hotel industry, unlike in Sri Lanka where there is considerable foreign participation. Such foreign participation had also been an entry point for international capital into the Sri Lankan real estate market, particularly in the Colombo city and its

environs. One consequence of this entry point of international capital into the real estate market in Colombo city was the astronomical increase in real estate or land values in recent years.

The prudence of the Bhutan Government's financial control of the hotel industry in Bhutan, and the dependence of the agencies on the Bhutan Government Travel Service to get their tourists clients into Bhutan (in stark contrast to some other third world countries, including Sri Lanka, who are dependent on international travel agencies and associations for tourist arrivals) is obvious when we read the analysis of Louis Turner —

"Beyond the physical flows of tourist-generated imports is the question of the financial flows stemming from the foreign control which is the normal pattern of this industry. In its purest form, the industry's hotels will be owned by international hotel chains who will siphon off a fair amount of the profits in the form of overseas remissions, and, in addition, there is the fact that those holding the top jobs (and therefore commanding the highest salaries) will be expatriates who are most likely to spend money on imported goods, or to bank their savings abroad. Even if the host government is trying to gain control of the industry, the employment structure of it will only change slowly, while the international hotel chains may well be retained on service contracts which, as experience has shown in other industries like copper, can give them an even better return than when they actually owned the facilities in question (in this case hotels). Finally, there is the fact that host governments may well offer tax-holidays which leave one wondering if they can ever get any return at all. A prime example is the Ivory Coast which is trying to build an African Riviera and offers touristic and hotel companies a variety of tax-exemptions lasting from five to ten years; in the case of the Club Mediterranee, the government actually financed and built the necessary premises on the understanding that the company would not have to pay anything back until occupancy rates had reached a certain predetermined and profitable level.

The dominance of the tourist-generating countries does not only show up in economic arrangements. There are also some political aspects of the industry which seem to be unusual for an international industry though not necessarily so for one so young, since its youth may mean that relevant host governments are not so attuned to economic realities as those in charge of an older-established one (say, oil) may be. For

instance I cannot think of equivalents in other industries to bodies like IFTO (the International Federation of Tour Operators) or TOSG (Tour Operators Study Group), which think nothing of flying a delegation down to a host country to complain about the deterioration of its standards (Tanzania), the organisation of an airport (Majorca), tax-increases in hotel bills (Greece), over-booking and currency declaration provisions (Tunisia), attempts to indigenize the employment policies of tour operators (Spain) or policies toward charter flights (Malta). One is almost as surprised by the success they have had in visits (normally they return to find the host government has taken the necessary steps) as by the fact that the host governments actually receive such delegations. It is extremely difficult to think of the oil industry sending a delegation to the Middle East to protest about OPEC's taxation policies, for instance".3.

May be it is too late for Sri Lanka to now fall in line with Bhutan's tourism planning, yet we may learn from it to convert the present trends of falling growth rate of tourist arrivals and dropping occupancy rate, possibly due to increasing hotel charges, to our advantage. May be it can be led to a policy of contained tourist arrivals but of a kind who are willing and have the funds to spend more at the rates we fix for the hotels. The containment of tourist arrivals may also contain the spread of tourism and some of its inevitable negative consequences over a larger geographical area in Sri Lanka.

Whatever the merits and demerits of low density high cost tourism; it implies that lowering of hotel rates is not necessarily the only answer to falling growth rates of tourist arrivals and occupancy rates. Accommodation capacity too needs careful planning and monitoring. It is always advantageous for the travel trade to ask for more accommodation capacity, for in any situation of excess accommodation capacity, they have greater bargaining power with the hoteliers on hotel charges.

NOTES:

1. Valene L. Smith — "Anthropology and Tourism — A Science — Industry Evaluation" — 1980 Annals of Tourism Research vii (i).
2. Micheal T. Kanfuran — "The Remote Kingdom of Bhutan welcomes a happy few". New York Times, November 16, 1980.
3. Louis Turner — "The International Division of Leisure: Tourism and the Third World". World Development, Vol. 4 No. 3, 1976.

Japan's growing share of the Sri Lanka market

For the first time in recent years Sri Lanka's monthly balance of trade (in merchandise) was found to be favourable when external trade statistics for November 1981 were released by the Customs recently. With imports in November 1981 at Rs. 2,125 million and exports at Rs. 2,276 million there was a surplus of Rs. 151 million in the trade balance. This was commented on very favourably by sections of the media, though they all failed to observe the main reason for the lower import bill was that while in the month of November 1980 the import of petroleum products added Rs. 1,230 million to the import bill, in November 1981 petroleum products imports amounted to only Rs. 196 million. This difference of Rs. 1,034 million contributed in large measure to the lower import bill in November 1981.

A more significant factor in the pattern of trade was the sources of supply of Sri Lanka's imports. Apart from the sources of oil supplies, viz. Saudi Arabia and Iran, (see tables) which generally account for

20% - 25% of the annual import bill, the other main sources of imports were Japan, U.S., U.K., Singapore, West Germany and South Korea which together have accounted for nearly 43 percent of the country's import bill in 1981, as seen in table 1.

The percentage share of imports from Japan is of significance in this regard. Under normal conditions Japan should have held the leading position but with the Iraq-Iran war in progress Iraqi oil supplies have been cut and its share concentrated more with Saudi Arabia.

Since 1978, following the introduction of liberalised trade policies, Japan has emerged as the major supplier of Sri Lanka's imports. Demand for foreign products was diverted to goods such as machinery, equipment, fertilizers, electronic and electrical goods and appliances, motor vehicles and construction materials, all of which Japan was in a strong position to supply. Japanese agencies moved aggressively into these markets and succeeded

in edging out the competition from most other sources in specific products such as motor vehicles, T.V. sets, electronic apparatus and construction materials.

A clear case in point is cement, which was the subject of a market study by the People's Bank, Research Department in 1981. Between 1978 and 1980 as many as 15 countries have supplied cement to Sri Lanka. In 1978 nearly all imports of cement came in from Philippines and Singapore; while in 1979 too these countries provided a major part of our cement imports though about seven other countries, including Japan, had also entered the market. In 1980, however, Japan had moved in as the leading supplier in terms of value from sixth position in 1979. In terms of quantity, however, Philippines and Singapore, were yet slightly ahead of Japan in 1980; and Sri Lanka imported cement from thirteen different countries that year. By 1981 supplies no longer came in from most of these sources and even the Philippines and Singapore had become comparatively small suppliers. For various reasons most builders have become convinced that there is no product comparable to the Japanese and supplies from other sources were not even being given consideration for this reason.

Table 1—IMPORTS 1981 AND BALANCE OF TRADE (according to 10 leading sources of supply)

Country	Value (CIF) Rs. Million	% of Total	Exports (FOB) Rs. Million	% of Total	Balance of Trade in Merchandise Rs. Million
1. Saudi Arabia	5,246.9	15.2	632.3	3.3	- 4,614.6
2. Japan	4,969.9	14.4	685.9	3.6	- 4,614.6
3. U.S.A.	2,489.6	7.2	1,290.6	6.7	- 1,199.1
4. Iran	2,349.8	6.8	488.6	2.5	- 1,861.2
5. U.K.	2,139.1	6.2	1,290.5	6.7	- 848.6
6. Singapore	1,904.5	5.5	457.2	2.4	- 1,447.3
7. Germany	1,741.5	5.0	1,115.3	5.7	- 626.2
8. S. Korea	1,556.4	4.5	9.2	0.0	- 1,547.2
9. India	1,459.6	4.2	563.6	2.9	- 896.1
10. Australia	1,067.8	3.1	210.9	1.1	- 856.9
Others	9,659.4	27.9	12,736.1	65.4	
Total	34,584.5	100	19,480.2	100	

TABLE 2—EXPORTS 1981 AND BALANCE OF TRADE (according to 10 leading markets)

Country	Exports (FOB) Rs. Million	% of Total	Imports (CIF) Rs. Million	% of Total	Balance of Trade in Merchandise Rs. Million
1. U.S.A.	1,290.6	6.7	2,489.6	7.2	- 1,199.1
2. U.K.	1,290.5	6.7	2,139.1	6.2	- 848.6
3. Germany FR	1,115.3	5.7	1,741.5	5.0	- 626.2
4. Saudi Arabia	632.3	3.3	5,246.9	15.2	- 4,614.6
5. Japan	685.9	3.6	4,969.9	14.4	- 4,284.0
6. UAR (Egypt)	623.0	3.2	25.3	0.1	+ 597.7
7. Iraq	588.4	3.0	5.7	0.0	+ 582.7
8. India	563.6	2.9	1,459.6	4.2	- 896.1
9. Iran	488.6	2.5	2,349.8	6.8	- 1,861.2
10. Malaysia	459.4	2.4	435.9	1.3	+ 23.5
Others	12,325.3	63.3	13,138.5	38.0	
Total	19,480.2	100	34,584.5	100	

Industry

Constraints to local industrial production and prospects

Although the rate of growth of industrial production in both the public and private sectors declined last year the Ministry of Industries expects a better performance in 1982. In a foreword to a publication from the Ministry's Progress Review Division, the Ministry's Secretary indicates that in 1982 a growth rate of about 10 percent is

expected in respect of the public sector industries under its purview.

In 1980 the increase in industrial production was estimated to be 6 percent, compared with 4 percent the previous year. The 1980 growth rate was still considered not sufficient to help the country to attain a reasonable economic growth rate:

since in order to achieve this target a growth rate of about 12 percent was required. In the light of this situation the production outlook in 1981 was described as "rather gloomy". Despite a marginal increase in total output of public sector enterprises (excluding the Petroleum Corporation) during 1981; in real terms, the overall output of public sector industrial enterprises is estimated to have recorded a decline of 1 percent last year, compared with production levels of 1980. This was mainly due to the substantial decrease in the production of the Petroleum Corporation whose refinery was shut down for repairs in February 1981.

There were also other sectors of industry which suffered a drop in production in 1981 as compared with 1980. An index maintained by the Central Bank revealed that output of fabricated metal products fell by 29 percent, output of the basic metal products and wood and wood products sectors fell by 14 percent; food, beverages and tobacco products by 7 per cent, and chemical products by 5 percent.

Officially the drop in production in the industrial sector has been attributed to the "unprecedented" interruptions of power the manufacturing industries underwent in the early part of 1981. However, the effect was minimised when several affected industries promptly adjusted to the situation by switching over to stand-by generators and making necessary adjustments in their work shifts.

There was also a restraint on bank lending and money was more costly and difficult to get. Advances granted by the banks, to this sector, indicated a substantially slow rate of growth in the first half of 1981 when compared with the corresponding period of the previous year. Advances granted to the wearing apparel and leather industries had declined by Rs. 105 million during this period. (Total

The advance of Japanese suppliers in the Sri Lanka market is evident in the growing value of imports from Japan as seen in table 3. Giving due consideration to the changing exchange rates and the value of the rupee, the upward movement in the value of imports from Japan can be seen clearly in these figures; rising from Rs. 398 million in 1977, to Rs. 1,590 million in 1978, Rs. 3,005 million in 1979 and Rs. 4,302 million in 1980 it reached Rs. 4,970 million by 1981. Other sources of supply as noted earlier, which significantly reflect the direction in Sri Lanka's import trade pattern, were US, UK, Singapore, West Germany and South Korea which together supplied more than 45 percent of Sri Lanka's imports in 1981.

The balance of trade (in merchandise) is also noteworthy in this regard. (See table 4). The largest adverse trade balance for Sri Lanka was Rs. 4,545 million with Saudi Arabia (whose market is very limited), followed by Rs. 3,953 million with Japan. The most favourable trade balance on the other hand was Rs. 547 million with Iraq and Rs. 536 million with Egypt. Among the countries of Asia, Malaysia stands out as the most favourable of Sri Lanka's trading part-

ners in 1981 having imported Sri Lanka produce to the value of Rs. 459 million. Of the 110 countries Sri Lanka traded with in 1981 she recorded a favourable merchandise trade balance with as many as 60 countries. Among the first 15 were the following:

TABLE 4
COUNTRIES HAVING FAVOURABLE
BALANCE OF TRADE WITH
SRI LANKA IN 1981

Country	(First 15 countries) Surplus Rs. Mn.
1. Pakistan	747.4
2. Egypt (UAR)	597.7
3. Iraq	582.7
4. USSR	413.8
5. Kuwait	330.6
6. Jordan	241.7
7. China	174.5
8. Syrian Arab Rep.	169.7
9. United Arab Emirates	149.3
10. Poland	121.5
11. Yemen	110.3
12. Chile	109.3
13. Italy	82.8
14. Czechoslovakia	77.0
15. Iceland	76.2

Source: Sri Lanka Customs Returns

Table 3—SOURCES OF SRI LANKA'S IMPORTS 1977-1981
(in order of main suppliers in 1980)

Imports	1977		1978		1979		1980		1981	
	Value C.I.F. Rs. Mn.	% of Total	Value C.I.F. Rs. Mn.	% of Total	Value C.I.F. Rs. Mn.	% of Total	Value C.I.F. Rs. Mn.	% of Total	Value C.I.F. Rs. Mn.	% of Total
1. Japan	398	100	1,590.4	11.0	3,005.3	13.3	4,301.8	12.8	4,969.9	14.4
2. Saudi Arabia	747	12.4	1,385.3	9.6	1,569.7	7.1	3,527.5	11.5	5,246.9	15.2
3. U.K.	327	5.0	1,396.1	9.6	2,014.9	8.9	3,206.0	7.6	2,139.1	6.2
4. Iraq	—	—	20.5	1.5	704.0	3.1	2,082.2	6.2	5.7	0.0
5. Iran	586	9.7	858.3	5.7	739.7	3.3	1,814.3	5.4	2,349.8	6.8
6. India	377	6.2	1,242.0	8.6	2,334.4	10.4	1,594.2	4.7	1,459.6	4.2
7. Singapore	126	2.1	405.0	2.8	1,358.8	6.0	1,520.1	4.5	1,904.5	5.5
8. U.S.A.	538	8.9	1,104.6	6.7	1,211.0	5.4	1,492.6	4.4	2,489.6	7.2
Others	2,908	48.4	6,611.2	45.2	9,622.6	42.7	14,098.7	41.9	14,019.4	40.5
Total	6,007	100	14,613.4	100	22,560.4	100	33,637.4	100	34,584.5	100

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bank advances to manufacturing industries by end of June 1981 were Rs. 3,324 million). The other industrial sectors which recorded decreases in their advances were basic metal products (Rs. 61 million); fabricated metal products, machinery and transport equipment (Rs. 50 million); and rubber and plastic products (Rs. 36 million).

One other significant factor which has begun effecting the smooth running of industries has been the gradual eroding away of important skills from the country. Scientific and Industrial institutions have been effected by a shortage of scientific and skilled personnel. There was also the continuing shortage of other managerial skills such as Accountants, categories of Engineers and Marketing personnel. By 1981, it was observed that even middle grades of skilled employees were in short supply. Personnel for skilled operations and even others like welders, carpenters, masons, electricians, drivers were getting very scarce. This effected the expeditious completion of capital projects and at times has even hindered normal production.

The question often raised, however, is-how far did the liberalised import policies affect particular industrial sectors? There is no doubt that in most of the particular products listed earlier (where production decreases were recorded) direct import and distribution has proved far more profitable. In the Public Sector the producers of paper, leather products, ceramics, steel and hard-

ware products faced strong competition from the imported products. For instance, the Ceylon Leather Products Corporation was finding it hard to face competition from cheaper varieties of footwear made from imported plastic materials. Or again, the National Paper Corporation encountered difficulties in marketing its products due to the import of a range of cheaper types of paper into the country. Another clear example that has come to light is that of glass. The Chairman of the Ceylon Glass Company (a Public Company) is reported to have told its annual general meeting recently that imports had very seriously effected the Company. There were 79,000 gross of unsold stocks of glasses and the loss for the year 1981 was Rs. 14 million. The two factories of the Company were temporarily closed for a period of 6 months as a result.

The Secretary of the Ministry of Industries observed at the end of last year that the importation of large quantities of low priced (even sub-standard) products was possible because certain countries offered special export incentives to enable surplus goods in their countries to be freely exported to countries like ours, which have liberalised import policies. He added, however, that: "in 1982 it is hoped that there would be some positive changes from the present position in respect of imported finished goods since it is expected that with the modifications in the tariff structure a fair competition with imports would

be permitted." His forecast for a 10 percent growth in public sector industries in 1982 appears to be based on this expectation.

There are signs that the liberalised policies have benefitted the industrial sector in certain respects. For instance there has been a deliberate attempt by manufacturers to upgrade their products and compete in the market with the imported goods. New machinery, newer technology and higher quality raw materials are all more freely available. Among some industrialists there has been a new enthusiasm and new patterns of production from about 1978. The results are seen in the generally improved standards, and quality of manufacture, in the local industrial sectors such as textiles and metal products.

The paradox in the situation is that while some industries have enjoyed the benefits of the liberalised economic policies and adapted themselves to compete with goods of international standards, other industries have found major constraints to their growth in these policies. (A survey conducted by the People's Bank Research Department showed that in 1978 just over 50 percent of local industries were adversely affected by the new liberalised policies). The most logical step therefore, would be to create an environment favourable to stimulating the expansion and upgrading of local industries while gradually eliminating the constraints they now face. Neither complete controls of imports nor complete removal of price controls have helped; the former has only resulted in a sheltered market and shoddy goods for the consumer, while the latter has resulted in manufacturers making unconscionable profits at the expense of the consumer. While it is vitally necessary, in the interests of local industry, to discourage the import of substandard goods it is equally important that free imports be permitted especially of essential raw materials and machinery, and also goods of quality which will help to set standards for local industry. A means of striking a balance in these two seemingly contradictory objectives is the problem now facing the different authorities responsible for industry, trade and aid.

PRODUCTION OF SELECTED MAJOR INDUSTRIAL ENTERPRISES IN THE PUBLIC SECTOR

	1977	1978	1979	1980*	1981*
1. National Textile Finished Cloth (Meters '000)	41,775	43,178	18,344	11,598	15,726
Wellawatte Coton Cloth (Meters '000)	11,296	12,474	10,816	9,166	7,571
Synthetic Cloth J. B., Ceylon Silks	4,682	4,580	3,976	3,261	2,115
2. Ceylon Cement -Portland met. tons	356,256	573,466	591,803	551,026	630,948
Masonry Cement	—	—	68,800	71,338	74,731
3. Paper-Paper & Product Mt. Tons	19,740	25,500	22,317	21,261	23,746
4. Steel-Rolled Products Mt. Tons	24,555	33,113	45,354	72,268	62,783
Wire products Mt. Tons	7,594	14,149	10,963	12,423	10,264
5. Oils & Fats-Provender Mt. Tons	44,420	41,817	62,927	80,927	47,693
Fatty Acid Mt. Tons	444	472	559	557	—
6. Plywood- Doors Nos.	32,736	19,638	43,201	121,055	21,108
Swan Timber Cu. Meters	2,471	2,786	2,775	3,166	1,435
Ply Board Sq. Meters	109	211	170	289	388
7. Ceramics- Crockery Mt. Tons	2,498	3,542	3,572	3,281	2,947
Sanitary Work Mt. Tons	648	812	829	1,068	1,040
8. B.B.C.-Soap Mt. Tons	6,050	6,279	6,226	5,316	4,706
9. Sri Lanka Tyre- Car & Jeep tyres Nos.	98,836	142,898	145,213	131,414	89,399
Tubes & Flaps Nos.	183,444	241,484	266,487	205,781	164,294

* Provisional

Source: Central Bank Monthly Bulletin, January 1982.

FEATURES

Some Aspect of the Foreign Currency Banking Scheme in Sri Lanka

Upali Vidanapathirana

Judging from the growth in the numbers of Foreign Currency Banking Units and their total assets and liabilities, over the last two years, since they were set up, the FCBU concept appears to have gained considerable ground in Sri Lanka. Upali Vidanapathirana of the People's Bank Research Department places this international banking concept in its regional perspective, and notes that unconfirmed data suggest that the bulk of the offshore business at present is centred round the prestigious international banks. A more specific evaluation of the performance of the FCBUs is not possible due to the relative inaccessibility of information.

The Foreign Currency Banking Scheme was introduced on May 2, 1979, with a view to promoting Colombo as an international financial centre. Instructions were issued by the Central Bank of Ceylon to all the commercial banks willing to participate in this scheme to establish Foreign Currency Banking Units.

These Units were considered to be a forerunner to the development of a fulfilled off-shore banking centre and by the end of 1981 as many as 23 of the 24 commercial banks operating in Colombo (see table 1) had taken to it. This includes the four local commercial banks, i.e. the People's Bank, Bank of Ceylon, Commercial Bank and Hatton National Bank, which entered into this lucrative trade by establishing F.C.B.U.s in their International Divisions. The participation of indigenous local banks side by side with branches of the established foreign banks, (both new and old) in the Foreign Currency Banking Scheme, intensified competitiveness of this trade.

A global view of the Off-shore Banking Centres suggests that they are known under different names, i.e. Off-shore Banking Units (OBUs) in Philippines, Asian Currency Units (ACUs) in Singapore, Overseas Banking Units (OBUs) in Bahrain, Foreign Currency Banking Units in Sri Lanka, Restricted Licence Banks (RLBs) in the United Arab Emirates etc. (1) The FCBUs in Sri Lanka have to move a few more steps to graduate to the stage of fulfilled off-shore banks. (In some instances the functions of the Unit (FCBU) have been restricted

only to transactions of an intermediary bank transferring deposits to major off-shore banks located elsewhere). The operations of these Units in certain areas have been restrained by the Central Bank of Ceylon to steer the financial transactions in a favourable direction.

PROSPECTS FOR OFF-SHORE BANKING IN SRI LANKA

Unlike most other Asian countries (with financial centres) like Singapore, Philippines and Hong-kong, the operations of foreign banks in a competitive environment, both for off-shore and domestic business had been hitherto unknown in banking circles of Sri Lanka.

The virtual isolation and lack of competition in commercial banking activities and money market operations had been reversed by the liberalization of economic policies in the latter part of the 1970s. The new economic policies invited both the local and foreign banks to enter into the lucrative off-shore banking operations. The economic and political environment, which is of paramount importance in the off-shore business, created a conducive climate for most of the foreign banks to enter into business. Among such conditions conducive to the setting up of off-shore banking business in Sri Lanka were the following:

The economic policies announced in 1977, which included an "outward looking growth strategy" based on open market operations, liberal import-export regulations and relaxed exchange laws.

The strategic location of the country, linking the West Asian petro-dollar market and the Far-Eastern Asian dollar market. Although locational proximity is not very important to the success of a fundamentally telex-oriented market it has a complementary effect. In addition, the time zone advantages by way of giving a fair portion of coverage to most of the financial centres (European, North American, Far-Eastern including Japan) for a reasonable part of the business day is another positive factor.

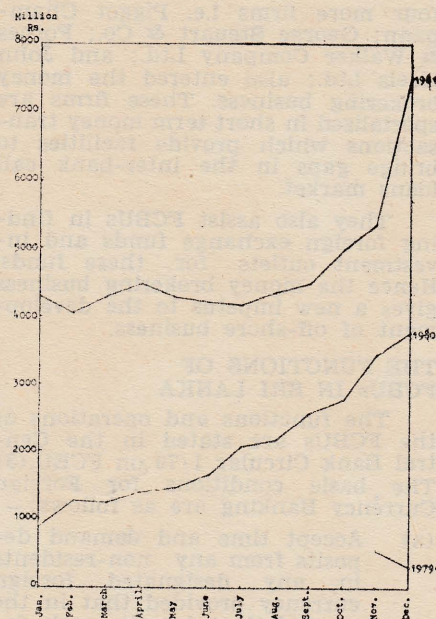
Foreign investors, including Multinational Corporations, are expected to come here to set up industries as GCEC projects. The FIAC projects (outside the Zone) are also expected to bring in a

pool of funds to be invested in this market. There has also been a possibility of attracting expatriate funds from America, Europe, Africa and the Middle East. The massive expansion programme of the local air line (Air Lanka which is again a GCEC enterprise) and other Air Lines operating in the region, demonstrate a very high investment capacity in the off-shore market of Colombo. So much so that Air Lines have been identified as among the best prospects as clients of the Asian Currency Units in Singapore. (2).

The availability of professional capabilities in the areas of management, costing, accountancy, banking and the legal profession is another advantage that gives Sri Lanka an edge over many other off-shore centres. Also, the capacity of Sri Lankan labour to be easily trained for absorbing into a new trade acts as another positive factor. Proper training is an essential requirement in off-shore business as most of the operations demand prudent and timely decision making that require both experience and aptitude.

The growth of supporting services including satellite services to link Sri Lanka with other business centres through an effective communication network is also a significant factor. In the year 1980 Sri Lanka witnessed another development in the short-term money market which is known as money brokering. The first to enter into this

Growth of Assets and Liabilities of Foreign Currency Banking Units (1979 - 1981)



Source: Central Bank of Ceylon

TABLE I
NAMES AND DATES OF OPENING (IN COLOMBO) OF COMMERCIAL BANKS OPERATING IN SRI LANKA.

BANKS	Year Operations Commenced in Colombo
Sri Lankan Banks	
1. People's Bank	1961
2. Bank of Ceylon	1939
3. Commercial Bank of Ceylon Ltd.	1969
4. Hatton National Bank Ltd.	1970
Indian and Pakistani Banks	
1. Indian Bank	1948
2. Indian Overseas Bank	1946
3. State Bank of India	1864
4. Habib Bank Ltd.	1951
European, American and West Asian Banks (New)	
1. Banque de L' Indochine et de Suz (Indo-Suez)	1979
2. Bank of Credit and Commercial International (Overseas) Ltd.	1979
3. City Bank N.A.	1979
4. American Express International Banking Corporation	1980
5. Bank of Oman Ltd.	1980
6. Overseas Trust Bank Ltd.	1980
7. Bank of America	1980
8. European Asian Bank	1980
9. Algemene Bank of Nederland	1981
10. Habib Bank N.G.	1980
11. Chase Manhattan Bank	1981
12. Union Bank of Middle East	1981
13. Dubai Bank Ltd.	1981
14. Amsterdam Rotterdam Bank	1981
Foreign Banks (Old)	
1. Hong Kong Shanghai Banking Corporation	1892
2. Grindlays Bank	1881

prestigious money business has been (BMRL) Bartleet Macklai and Roy Ltd. This is a money brokering cartel formed among Macklai and Macklai from Bombay, Roy Sabbas from Calcutta and the Bartleet Company of Sri Lanka. By the end of the year four more firms i.e. Piggot Chapman; George Steuart & Co.; Forbes & Walker Company Ltd.; and John Keels Ltd.; also entered the money brokering business. These firms are specialized in short term money transactions which provide facilities to bridge gaps in the inter-bank call loans market.

They also assist FCBUs in finding foreign exchange funds and investment outlets for these funds. Hence the money brokering business gives a new impetus to the development of off-shore business.

THE FUNCTIONS OF FCBUS IN SRI LANKA

The functions and operations of the FCBUs are stated in the Central Bank Circular 1/79 on FCBU.(3) The basic conditions for Foreign Currency Banking are as follows:—

- (a) Accept time and demand deposits from any non-residents in any designated foreign currency provided that in the case of time deposits such deposits are not less than US

\$10,000 or its equivalent. However, the opening of savings accounts or accounts from which funds are withdrawable by cheque is not entertained. Those deposits include short term call deposits (over night call-deposits; twenty four hour call deposits, seven day call deposits etc.), and fixed time deposits where the time ranges from one month to 90 days and sometimes even more. Competitive interest has to be paid, depending on the type of the currency, and the trends of the competitive market. (see table II for a breakdown of deposits).

- (b) The maturity pattern of the deposits of these units are given in table II; and a point worth noting is that nearly 80% of the deposits mature in a period of less than 3 months. This pattern vaguely indicates the dominance of short term call deposits in the F.C.B.U.s of Sri Lanka. According to this table the role played by the fixed time deposits with the maturity ranging from 6 months to 3 years had been only 6.9 per cent of the total deposits.

In the case of the GCEC enterprises they are considered to

have non-resident status and are entitled to making deposits in designated foreign currencies, where those funds do not result from export of GCEC products from Sri Lanka.

In addition, the Central Bank has the sole authority to extend approvals to other local enterprises to be treated as non residents eg. Air Lanka and the Petroleum Corporation.

- (c) The borrowing of any designated foreign currency from any non-resident including FCBUs and other off-shore centres: This includes borrowings from non residents (Non-bank, and Bank) and residents (Central Bank, Commercial Banks, F.C.B.U.s, G.C.E.C. and other approved ventures). Inter bank transactions perform a vital role in this sphere of activity where the cog in the wheel is often a brokering firm. Money brokers act as intermediaries in these transactions, and the rate and volume of such transactions are decided upon competitive bidding. Furthermore, the FCBUs can borrow foreign currency at or slightly above the LIBORs (London Inter-Bank Offered Rate) and the SIBOR (Singapore Inter-Bank Offered Rate).
- (d) The FCBUs are entitled to engage in any other transaction in foreign currency where the necessary approval can be obtained from the Central Bank of Ceylon. In addition the circumstances may permit the FCBUs to accept time and call deposits from any resident, which is a Commercial Bank (or even the Central Bank) and to grant loans and advances to them, in any designated foreign currency.
- (e) The advances (lending) in the off-shore transactions include both short-term and long-term loans. Short-term and long-term loans include placements, and short term call loans while the long term loans are called Fixed Time Loans. Reputed FCBUs can arrange large sized loans where the foreign currency commitments are comparatively high and where a number of banks participate by way of syndication.
- (f) The FCBUs, according to the directive, should be allowed to operate complete and independent units and their books (accounts and records) in respect of transactions should be maintained separately from the other general transactions of the bank.

At the inception of the scheme US dollars and Pounds Sterling were given the status of "designated currency". In September 1979, the following eight currencies were granted "designated currency" status: French Franc; Japanese Yen; Netherlands Guilder; Pounds Sterling; Swedish Kroners; Swiss Francs; United States Dollars; and West German Marks.

In addition both Singapore Dollars and Hong Kong Dollars were granted approval as "designated currencies" in 1980.(4).

THE PERFORMANCE OF THE FCBUs IN SRI LANKA

The performance of the Foreign Currency Banking Units as measured in terms of number of Units in operation; their volume of assets and liabilities and the portfolios of assets can be noted as "favourable" as far as their original objectives were concerned. To quote the 1980 Annual Report of the Central Bank of Ceylon: "The operations of the FCBUs increased during the year creating a nucleus of an international money market in Sri Lanka."

The Central Bank's Annual Report for 1981 goes on to comment "The Foreign Currency Banking Scheme (FCBS) which was introduced to provide nucleus of offshore banking activities in Sri Lanka, showed remarkable progress during 1981. Total assets and liabilities of these units rose from Rs. 3,796 million at the end of 1980, to Rs. 7,516 million at end 1981. A salient feature of the expanded off-shore banking activities in Sri Lanka was the FCBUs participation in the syndicated loan of US\$ 75 million, raised by the Government from the Euro-currency Market."

Table 11 — PERFORMANCE OF FCBUs IN SRI LANKA (operation in Rs. Million)

Indicators	1979	1980	1981
F.C.B.U.s	11	18	23
Total Assets & Liabilities	602	3,796	7516.4
Liabilities of non-resident Banks	100	179	923.9
Liabilities Residential transactions	33	402	2326.7
Assets (None-resident)	N.A.	1,482	4212.5
Resident Commercial Bank borrowings	Non-Existent	410	1034.8

This is further illustrated in Graph I which shows a significant growth in the assets and liabilities. It was observed that the contribution of the Off-shore Banking Units to the overall economic growth rates of East Asian countries has been impressive. Therefore it would be opportune to evaluate the performance of the F.C.B.Cs in the first few years with that of the performance of the A.C.U.s (Singapore) and O.B.U.s (Philippines) during the corresponding periods.

The growth rate of Sri Lanka's

FCBUs compares favourably with the performance of the Asian Currency Units of Singapore. The ACUs started in 1968, showed a growth in terms of units and combined assets of US\$ 106 million in the initial two year period. (6) By the end of 1972 (after five years of operations) there had been 24 Asian Currency Units while the assets/liabilities swelled to US\$ 2.97 billion. However, the contemporary Off-shore Banking Scheme (OBS) started in 1977 in the Philippines had surpassed its counterpart in Colombo. The total resources of the OBS for the first six months had been US\$ 757 million, which had swelled to US\$ 1,987 million by the end of 1978 i.e. in only a one and a half year period. (7).

The performance of the FCBUs by individual Units cannot be evaluated due to the relative inaccessibility of information. Unconfirmed sources suggest that the Units of prestigious international banks have performed comparatively better. Some of the Indian Banks, for example the Indian Overseas Bank, had arranged and participated in large scale transactions: consortium loans which include financing power projects in Manila, chemical exports in Poland, construction in Iraq etc.

Of the four FCBUs set-up by the Local Banks, the Bank of Ceylon, so far has been successful in attracting non-resident deposits. During a one year period from July 1980 to July 1981 the Bank of Ceylon had participated in 2 consortium loans, according to the report on Activities and Achievements in the Public Sector, by the Ministry of Plan Implementation. (8).

During the month of December 1981, alone, the total assets/liabilities of FCBUs, in terms of U.S. Dollars rose sharply from 258 million to 366 million. The funds obtained by

FCBUs in the form of deposits and borrowings from foreign banks abroad, were largely responsible for this increase in liabilities. On the assets side, loans and advances to non-residents rose by U.S. \$ 52 million and amounted to U.S. \$ 205 million. Also, the loans and advances to residents rose by U.S.\$ 57 million and amounted to U.S.\$ 144 million by the end of December 1981.

Off-shore transactions can be a highly profitable venture and offer very attractive financial prospects to Bankers. However, tapping of these

prospects depends much on particular skills, which may cause an additional burden to the banks in the initial stages. This burden, lies in the areas of investment on human (for training personal) and material (purchasing of computers, telex equipment etc.) capital which could be recovered in a very short spell of successful off-shore operations.

The bulk off-shore operations are centred around the vast sums of surplus funds in major currencies, which are placed on deposit by Multinational Corporations, Banks, and even by States. Euro-dollar, Euro-sterling, Petro-dollar and Asian dollars are some of the terms used to denote these surpluses. They are generally at the disposal of multinational companies, at competitive rates. If the proper climate is created in terms of banking legislation, tax structures, political and economic stability, and also infrastructure requirements, the movements of banks and funds to these centres can be made very positive.

For the banks operating in a successful off-shore centre, the prospects in terms of drawing non-resident funds, and re-lending them for lucrative ventures are "highly attractive". It is this factor which attracts many of the internationally recognized banks to off-shore financing activities as a new prospectively profitable venture, where foreign exchange in bulk can be earned with minimum overhead and tax commitments. In these transactions there is no necessary connection between the currency borrowed, and the country of residence of the borrower, the lender and the intermediary banks.

Efficiency in management, and operations is the keynote of off-shore financial transactions. Unlike in general commercial banking the role of management and skilled decision taking ranks very high in day to day functions where most of the operations are automated. Proper training is essential to upgrade the quality and skills of human inputs which is relatively small in comparison with business volume and profits. Even the recruitment of personnel has to be done very carefully, where high recognition is given to factors like academic background, distinction in the areas of Business Management, Costing and Accountancy, and a high standing in the aptitude tests.

The importance of management has also risen as a variety of human inputs like Accountants, Project Analysts, Lawyers and Economists, have been employed side by side with technical personal handling telex screens, telephone and other methods of communication with the aid of computers in such Units.

As the entrance of prestigious international banks is crucial in deciding the viability of an off-shore centre, it is these banks that harvest the majority of the benefits of off-shore funds. For example, a group of American banks, led by Bank of America, gave the initial push to the growth of the off-shore market in Singapore. So was it in Philippines and Bahrain. For a newcomer it takes some time where a great deal of effort has to be made for the scheme to get off the ground. In Sri Lanka too, unconfirmed data suggests, the bulk of the turnover of the off-shore business at present is centred around a number of prestigious international banks. However, it does not mean that the banks of purely local origin are cut-off from off-shore business. If the local banks have the necessary foresight and the courage and vigour to undergo the initial hardships, where initially some investments have to be made to provide the infra-structure and training required, there are ample possibilities of extending their business to cover this lucrative off-shore activity.

NOTES

- (1) Wickremasinghe Wimal, "Export Processing Zones in Sri Lanka; A Monetary Approach. A.P.O. Symposium on Economic and Social Impact of Export Processing Zones. Colombo 1980.
- (2) Sophistication comes to the Asian Dollar (off-shore Banking in Singapore-Asian Banking. Asia Week 20 July 1979.
- (3) Circular 380, FCBU 1/79, Controller of Exchange, Central Bank of Ceylon.
- (4) See Circulars No. 381 (F.C.B.U. 2/79, 3/79, 6/79) Banking Department.
- (5) Review of the Economy, Central Bank of Ceylon Colombo 1980.
- (6) Sophistication comes to the Asian Dollar op. cit.,
- (7) The Off-shore Bankers' Progress-Asia Week, June 8, 1979.
- (8) Activities and Achievements July 1980 - July 1981 Ministry of Plan Implementation, Central Bank Building, Colombo 1.
- (9) Central Bank Monthly Bulletin, January 1982.

Overall Energy Planning and Management in Sri Lanka

K. K. Y. W. Perera

The need for managing energy demand and supply in all sectors in Sri Lanka, in an integrated manner, particularly in the context of very rapidly rising energy costs and increasing scarcity of existing supplies is most needed today, emphasises Prof. K. K. Y. W. Perera Chairman, Ceylon Electricity Board, and Secretary, Ministry of Power and Energy and Professor of Electrical Engineering, University of Moratuwa in this paper. He attempts here, therefore, to match demand and source according to "quality of energy" and according to "resource availability" and suggests that once targets are identified the consumption and production of energy should be diverted accordingly.

Independent demand predictions followed by energy supply plans worked out to match such demands may not give the optimum results. For instance, an electricity power and energy demand plan prepared in isolation, and attempts to instal power plants to match such demands, may later on not prove to be the most prudent course. It is possible to shift energy demand from one type (electricity, oil, firewood etc.) to another, within certain limits, by the use of policy tools or 'forcing function' such as pricing, propaganda etc. He thus maintains that with efficient use of energy, demand shifting, and proper management substantial energies can be allocated for industrial and commercial growth.

Introduction

Energy costs have risen sharply during the last decade; they are still rising rapidly. The public has felt the effect of this as increases in transport costs, kerosene oil prices, electricity bills, fertilizer prices etc. To the treasury this has meant finding large foreign exchange requirements for the import of oil—the oil import bill absorbs a considerable part of the entire export earnings. In addition, vast sums of funds have to be found for the capital requirements of Electrical Power stations. Increasing extents of forests are being devastated in search of additional firewood.

The only large scale indigenous resources currently used in Sri Lanka are hydro-electricity and firewood, there are no known resources of oil, coal or gas. The potential hydro-electric energy which can be developed is limited and requires a very heavy capital investment, largely foreign in nature. Though the resources are limited, sufficient increases of energy must be found annually to meet the rise in demand due to industrialization and national growth. In this context, management of both supply and utilization in an optimum manner, taking short-term interests and long term requirements into account, is of great importance.

Demand on Different Types of Energy

Interdependence of demand of different Types of Energy.

Demand on energy is created by end users. In many applications the end user can utilize different forms or supplies of energy to satisfy his requirement. For example, domestic lighting can be through electricity

or kerosene oil or petrol. Among those which are utilized widely for cooking are electricity, kerosene oil, firewood and Liquid Petroleum Gas (LPG). Thus the demand on electricity will depend on the extent people will change from kerosene oil lighting to electrical lighting. It is even more dependent on the possible change from firewood cooking to electrical cooking, because of the much larger energy requirement for this purpose. Similarly, the demand on oil, firewood and other forms of energy are also inter-dependent; in many applications one form of energy can be substituted for another.

Implication of Demand Interdependence on Forecasting.

The Type of interdependence illustrated above is of great importance in proper long-term energy planning and management. One implication of the above is that a demand forecast in an isolated sector such as in electricity or in oil, cannot be made reasonably without reference to the other energy types. For example, of the energy consumed in Sri Lanka, firewood accounts for over 50% and is used mostly for cooking. Thus if a fraction of the firewood users switch over to electric cooking — which could happen in the long-term, dependent on pricing and many other factors — the electricity demand 'estimates' may be exceeded by a wide margin.

Implication of Demand Interdependence on Type of Energy Management.

Another important implication is the ability to induce many end-users to select or change-over to a type of energy in accordance with national goals. This means the policy tools or "forcing functions" such as pricing, propaganda, training, phy-

sical controls etc. can deliberately be used in such a manner so as to move the demand on energy from one type to another. In the context of the very large expenditure on energy, it is in fact quite important that optimum movements of the above nature are identified and deliberately induced in a long-term energy programme. In the context of long-term demand, estimates of each type of energy required should be worked out taking into consideration the effect of such judiciously applied forcing functions.

Presently Available Demand Predictions.

Unfortunately, none of the demand predictions so far available regarding Sri Lanka have been prepared in the manner described above. The demand predictions so far available are "isolated" forecasts in the context of energy type interdependence, although other important parameters such as population growth, G. D. P. growth etc. have been considered. This is not surprising, because identification of certain goals and acceptance of suitable forcing functions must precede such demand prediction. The goals too should be moved in a realistic manner as time unfolds, dependent on the states which are observable. The policy tools or forcing functions can be used not only for diverting end user energy from one type to another; they can be used for general management of energy, its efficient use, reduction of waste, and even to influence human settlements and future development plans towards energy efficiency.

As a prelude to defining goal areas very broadly, certain underlying principles will be examined in the following sections.

Choice of Energy Type for Different End Uses

"Quality" of Energy.

For simple heating needs such as in cooking, it is possible to obtain the energy by burning kerosene oil, firewood, paddy husk, sawdust, agro-waste, peat, coal, L.P. gas, electricity etc. using simple appliances. But for turning a grinding machine the choices available are much less; usually an electric motor or an oil driven engine has to be used. To work a radio, operate an amplifier or a telephone exchange, there is no choice; electricity is essential. Thus it is seen that certain types of energy are more versatile than others from the point of view of the user. It is therefore possible to think of the more versatile types (or sources) of energy as being of a higher "quality" because they lend themselves to a multiplicity of uses relatively easily.

In another attempt to define the quality of energy, it is possible to examine the intensity or

concentration of extractable energy in the source material. For example, peat contains lesser calories per kilogram than coal; coal contains lesser calories per kilogram than diesel or furnace oils. Hence peat, coal and oil can be viewed as sources of energy categorized in an ascending order of "quality". In a similar way, "wind energy" and "wave energy" are dilute forms of low quality" in comparison to oil, coal or peat. To some degree this notion of quality is consistent with that brought out in the earlier paragraph. In the example chosen here, oil (high quality) can be used in diesel engines and boilers but coal (lower quality) cannot be used for diesel engines.

A third way of looking at the "quality" of a type of energy is through an examination of the sophistication required to produce it. Wood, peat and coal are obtained in relatively raw form. Mineral oils generally involve heavy initial investments and need refining to various degrees. Production of electricity requires sophisticated, and high capital cost equipment, and may in many cases use oil as a "raw material."

It is possible for a variety of other interpretations (some of which are scientifically better definitions) to be given to the term "quality of energy". For the purpose of this paper, the interpretation advanced in para one of this section will be generally accepted; that is, a high quality energy or energy source can be used for a variety of end uses with relative ease. The interpretations given in the previous two paragraphs can be viewed as properties which high quality types of energy often (but not always) possess. (It will be observed that no attempt is made at this juncture to make a distinction between types of

Energy Quality Class	Type or Source or carrier
Very High (VH)	Electricity
High (H)	Diesolene Furnace oils Bunker oils Coal
Medium & Low (M) (L)	Peat Firewood Wood waste Paddy husk Saw-dust Agro-waste
Very Low (VL)	Wind Tidal Ocean Thermal Energy (OTEC) Wave

Table 1. A Classification according to Quality of Energy.

energy and sources of energy. They can all be even thought of as "energy carriers" because very often they are converted to a different form by the user)

It can now be attempted to classify different types or sources of energy according to their quality class. The following classification is the result of such an attempt; it is not a complete classification but is only an approximate guide for the present purpose.

Matching of Energy Type End-use Requirements according to Appropriate Quality.

As a general long-term policy (subject to a few exceptions) energy at a Very High (VH) or High (H) quality should not be encouraged for use which can be managed by a lower quality type. This is best illustrated by some examples. For instance, house-hold cooking can be done with electricity which is a very high quality energy. It is a very convenient form of energy, and many house-wives would prefer its use. But basically the same function of cooking can be done using kerosene oil or firewood. Shouldn't any of the latter sources be preferred to electricity from a national point of view?

First, consider electricity versus kerosene oil for cooking. A kerosene burner is a fairly simple and inexpensive device; it could easily be used to convert the chemical energy in kerosene to heat energy required for cooking. If electricity is to be used for cooking, the generation of electricity itself may be by oil (diesel oil or furnace oil or coal which may be slightly cheaper than kerosene). In the process of generation of electricity by oil, it is first converted to heat and then to mechanical energy and thereafter to electricity with efficiencies in the order of 30%. The electricity has usually to be transmitted, distributed and reconverted to heat for cooking. All these are associated with further losses. Thus it requires 3 or more times the quantity of oil for cooking through electricity compared with directly using oil in the kitchen itself! In other words, use of oil directly should cost only about a third of using electricity generated through oil.

In Sri Lanka, fortunately, electricity can be generated through hydro-power sources. This invalidates the above argument to some extent. Let us therefore examine the position of hydro-electricity for cooking. The capital cost of new installations of hydro-power are typically around Rs. 35,000/- per kW. Of this over 60% is foreign cost required for machinery import and other purposes. A kilo-watt is about the power required by a small hot plate used for cooking. Due to the diver-

sity effect of consumer demand, although a full Rs. 35,000/- does not have to be invested by the Power Authority to Supply each hot plate used by domestic consumer, a good fraction of this amount is needed. Further, the increased capital needed for strengthening distribution has to be borne.

To examine the hydro-electricity kWh costs in an approximate manner, let us assume that the water availability is sufficient to run the hydro-power plant at 40% annual plant factor. The corresponding units of electricity per kW installed is $8760 \times 40\% = 3504$ kWh per year. If the interest rate on capital (Rs. 35,000/-) is 10%, then the interest charge alone amounts to approximately Rs. 3,500/- per year. These figures point to an approximate figure of about one rupee per kWh unit of electricity, neglecting all other associated costs. Though not as high as the cost of thermally generated electricity using oil, these costs are of the same order. This fact, together with that given in the last sentence of the paragraph preceding the previous paragraph indicates that the use of oil directly in the kitchen for cooking is more economical, nationally than using hydro-electricity for this purpose.

The assessment given above will of course depend on the actual oil prices and the capital cost of hydro-power plant, both of which are rising though not at identical rates. The assessment will also depend on the interest rate actually applicable, or at times on opportunity costs for long term planning purposes. In any case, the arguments given above are advanced purely as an example to compare "very high" and "high" quality energy usage in cooking; they are not intended to support the use of kerosene oil as an energy source in absolute terms for cooking purposes.

Now consider the use of firewood for house-hold cooking. It is an energy source of lower quality than oil or electricity, but is of adequate quality for day to day domestic cooking purposes. Firewood can be obtained from natural or grown forests and can be directly used without high capital cost and sophistication needed to produce electricity. (The energy in firewood comes in fact from the sun, and is a type of energy which can be renewed through sufficient coverage of fast growing forests. Growing of such forests will also increase employment at a decentralized level). In most locations in Sri Lanka, if used in conjunction with a moderately efficient hearth, firewood is much more economical than kerosene oil or electricity of realistic prices. The dependence on oil and imported technologies is also minimal with fire-

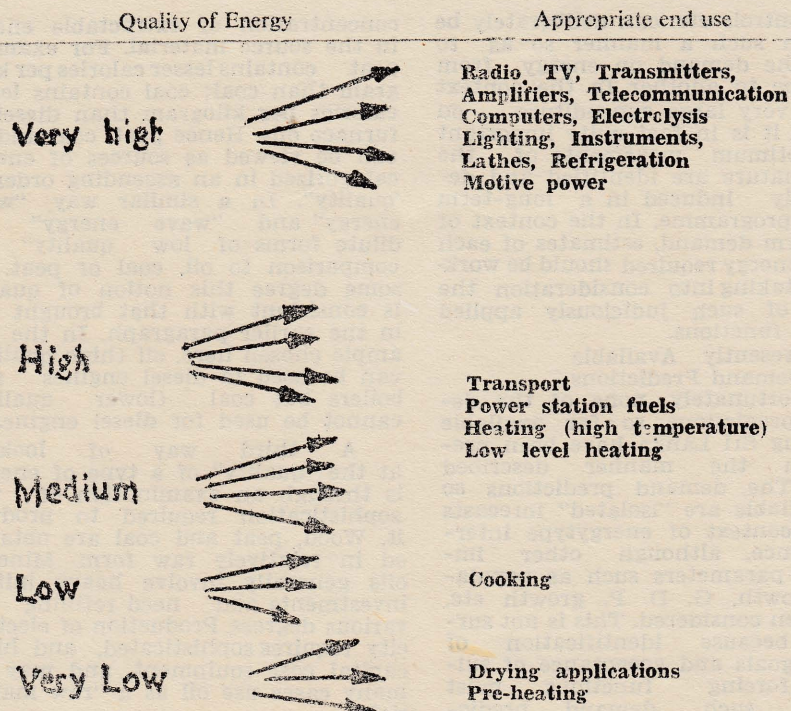


Diagram 1 — Matching End use according to Quality of Energy. An approximate guide-line only.

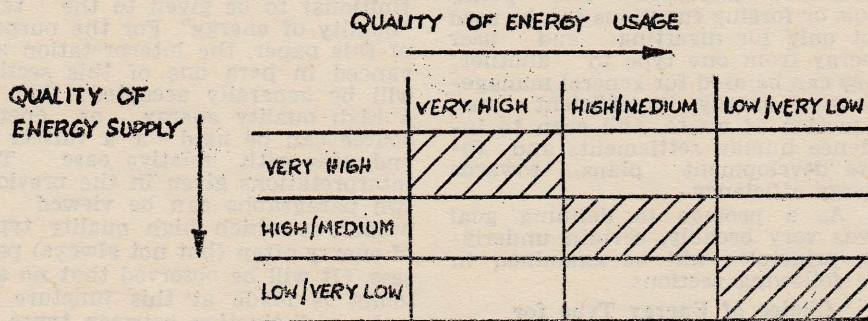


DIAGRAM 2. ENERGY SUPPLY-USAGE MAP INDICATING MATCHING ACCORDING TO QUALITY

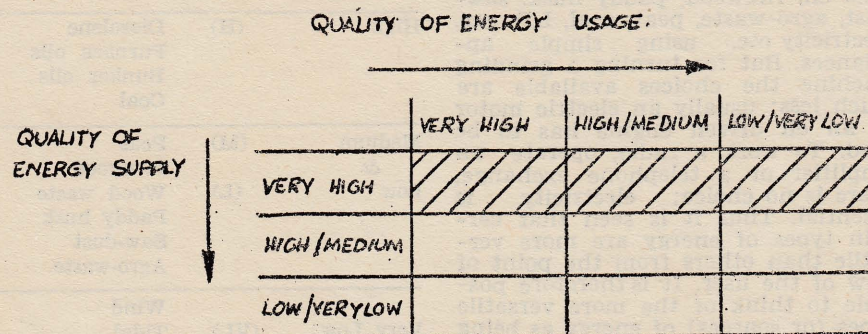


DIAGRAM 3. ENERGY SUPPLY-USAGE MAP INDICATING MIS-MATCH BY QUALITY

wood use. Thus firewood, under planned conditions, is appropriate for most cooking needs. (It can also be used in many industrial heating applications). In locations and circumstances where they can be used, paddy husk and saw dust which are further down the quality scale of Table 1 can be used to national advantage.

Consider now the circumstances where electricity, classified as high quality, is appropriate. In radio receivers, transmitters, television, computers, telecommunications, electrolytic processes etc. electricity is a necessity. For motive power, say in a lathe, its use is desirable due to convenience, controllability and other factors. In lighting too electricity has un-matchable qualities. For similar and several other end uses the "Very High" quality electricity becomes appropriate. For most heating applications, including those in industry, electricity is a luxury and should naturally get "priced out", unless open or hidden subsidies are injected.

There are exceptional circumstances under which electricity of VH quality may be desirable for ordinary heating. For example, if due to exceptionally heavy rainfall, the hydro-power reservoirs are spilling, it may become advantageous to use electricity wherever it can be made use of. But such instances are rare and are exceptional. They belong more to the category of opportunities that should be availed of in the short-term and are not generally influential in long-term energy management and planning.

To summarize "matching of Energy quality to end use needs" implies use of higher quality sources in a few restricted desirable applications. Lower quality energy with limited applications are to be used whenever they can be used. Diagrams 1 and 2 illustrate this strategy. Diagram 3 indicates mis-match by quality of supply and usage.

Matching of Energy Type to End Use Requirement according to Energy Resource Availability.

Matching according to national resource availability is yet another important consideration, from the point of view of economy, employment and independence on international situations. "Matching by type according to resources" need not necessarily give the same result for the type of energy appropriate for different end uses as derived by "matching according to quality" described in the previous Section. However, it is fortunate that in the Sri Lanka situation, both methods lead us to the same basic conclusions with regard to the types of energy appropriate in the long term, as will be seen in the following paragraphs.

Sri Lanka has no known coal, oil or natural gas resources. It has limited hydro-power potential; about one fourth is now harnessed and the balance is yet to be developed and would require tremendous local and foreign capital investment². Sizable forests are available and the geographic conditions are such that growing of trees is relatively easy. Direct solar and wind energy availability is good, though their utilization poses a number of problems due to very low quality.

Thus the only national resource of energy at the high quality and of a sizable magnitude, is hydro-electric energy. The total potential of large-scale hydro-power is estimated at around 6500 GWh per year² which would indicate an installed capacity of 1600 MW at 46.4% plant factor. The hydro-power plant that is presently (mid 1981) commissioned is 370 MW and yields about 1600 GWh per year. The present estimated demand is also about 370 MW (peak) at around 1850 GWh per year (which has to be met using hydro and thermal electricity).

From the above, it is seen that since the present hydro-electricity development cannot absorb any additional electrical demand arising due to heating or other requirements most of such requirements will necessarily have to be met with thermal electricity generated from petroleum oils. It is therefore more reasonable to use oil directly for heating applications rather than electricity. (It is preferable to use firewood or wood-waste or paddy husk where possible). The electricity available, if relieved from heating applications as far as possible could be put to better use in motive power uses in machinery etc.

When looking at the future, in 10 to 15 years time (depending on the extent of application of forcing functions mentioned in the previous Section which could vary the demand growth rate) the electricity demand would reach a value exceeding the hydro-electric potential of the country. Here again is a situation where the limited very high quality type electrical energy would have to be reserved for end uses where its availability would be essential. The maximum possible use should then be made of firewood, wood waste, wind, solar etc. where such sources could be directly harnessed. In the intermediate period from now till 10 to 15 years too, it is not possible to make hydro-electricity abundantly available at cheap prices, because of the long lead-time and heavy investment needed for hydro-power construction. Thus to match by resource for hydro electricity, we must divert

all low quality users away from electricity.

The large scale medium/low quality energy Sri Lanka now possesses is from firewood. The source accounts for about 55% of the total energy used, and comes from about 4.5 million tonnes per year of firewood, with adverse effects on the forests. With adequate attention to reforestation and afforestation, it should be possible to maintain this level of firewood supply. Under normal circumstances, however, the annual demand for firewood would rapidly increase due to population increase, as well as increases for low quality heat for industries. Several existing industries inclusive of tea drying are changing over to firewood heating from oil fired heating, due to oil price increases. New industries will tend to design for use of firewood in preference to oil. Resource matching would therefore become impossible, except as indicated in the following paragraph.

Of the total 4.5 million tonnes per year of firewood consumed about 4.0 million tonnes are used by the domestic sector for cooking purposes. The cooking is done by a simple hearth, of very low efficiency. Low cost improved hearths which consume about a third of the normal extent are being used in India, China and other countries; prototypes of such devices have been made and tested by the Industrial Development Board. Further improvements and wide-spread use of such devices should enable the reduction of firewood consumption to a half, if not one-third. The firewood thus saved could be channelled to meet the growth in industrial needs of medium/low quality energy.

As there are no indigenous sources of coal or oil (or natural gas), an attempt should be made to contain the consumption of these roughly at current levels without impairing industrial and G. N. P. growth. Most transport needs in Sri Lanka in the next 10 years or so will have to be met from oil sources. Thus, to meet the demand of increased transport requirements, increased oil supplies will be needed. Hence to keep the overall oil imports at substantially constant levels, the industrial heating energy requirements should be progressively met with medium/low quality firewood, paddy husk, wood-waste etc.

It is now seen that matching according to resources in the Sri Lanka context, coincides roughly with matching according to quality. If matching by resources is superimposed on diagram 2, the top left-hand corner square implies electricity used for radios, TV, telecommunications, computers, electroche-

mical uses etc. and some lighting, as well as motive power and some transportation. The centre square would include oil use in major transport, some heating, motive power etc. (This resource is not indigenous and therefore an attempt may be made to keep it static or within the capacity of the local refinery.) The bottom right-hand square includes utilization of firewood, wood waste, solar heating etc. in industry, low temperature applications, cooking, water heating and a multitude of other uses.

Energy Economy and Non-Traditional Energy Sources

More Efficient Use.

In many instances, a given task can be carried out with a lesser energy expenditure than usual. For example, to light a room a 20 watt fluorescent lamp can be used, giving a brightness of more than a 60 watt incandescent lamp. A meal can be cooked with about 1/3 of the normal amount of firewood now consumed, using a more efficient hearth. Power-factor correction in factories can reduce generation requirements of electricity through reduced transmission and distribution losses. Proper lagging of boilers, ovens and heated pipes can cut-down fuel costs. There are large number of similar identified applications where more efficient use of energy can be made. **But such efficiencies in the use of energy will not happen automatically or be implemented by end users without effort; Such efficiencies should be caused by national planning and energy management through policy tools or forcing functions. The forcing functions referred to are pricing, propaganda, education and training, rationing, physical controls etc.**

There are methods by which the society can be structured for efficient use of energy or its conservation. One such example already implemented is the introduction of the five-day week in Sri Lanka, subsequent to a rapid rise of oil prices and transport costs. Saturday was declared a non-working day; working hours per week day were increased correspondingly. By doing this, energy saving on Saturday transport has been achieved. The five-day week would undoubtedly have modified the living pattern of many persons.

For long-term energy management and planning, it is possible to examine and modify buildings, roads, towns, villages, settlements etc. Particularly such modifications can be achieved at the planning stage

of new developments. Natural lighting to minimize electricity needs in buildings, through ventilation to reduce on Air-conditioning requirements and the use of fluorescent lighting in place of ordinary incandescent bulbs are just a few examples applicable to buildings in Sri Lanka.

For quite some time to come, large scale transport in Sri Lanka will have to depend on oil, although a limited extent of urban and suburban transportation may be electrified to advantage. In any case it is necessary to improve the efficiency of transportation. Goods transportation through railway should be stream-lined; it is an accepted fact that goods transport by train is more energy saving than road transport. Canal, River and Sea transport methods are feasible to implement within a 10 year planning period. Idle travel of taxis, buses, breakdown vehicles for utilities such as the Electricity Board can be reduced through efficient telecommunication and radio communication facilities.

Non-traditional Energy Sources

Under this category a variety of sources can be classified. Examples are bio-gas, paddy husk, saw dust, wood-waste, wind-energy, some solar heating applications, solar cells and ocean thermal energy conversion. It is not the intention here to identify the exact degrees to which these can be developed/used; it is only intended to invite attention to the salient factors relevant to the theme of this paper.

Most of those cited in the above paragraph, except the first four, suffer from the highly dilute form or low entropy of the energy available. Hence its extraction requires large structures, surfaces etc. and is associated with heavy capital cost. Except for saw dust, paddy husk, wood-waste and agro-waste, a large scale utilization of the others in the next 10 years would be extremely difficult. Saw dust and paddy husk are already in fairly wide use for domestic cooking. Paddy husk is already being used by a few for tea drying and its use can be accelerated with relative ease. If a concerted effort is made and policy tools are utilized, it should be possible to bring into utilization a majority of the paddy husk, saw dust and wood-waste during the next five years.

Wind-energy, though it is a dilute form, has certain direct applications such as pumping of water in a field. Since the rotary motion is used in the mechanical energy form

itself (without conversion to electricity as required for lighting) the initial and maintenance efforts are not too complicated, and in a 10 year programme wind energy can be expected to fill a narrow gap.

It is necessary to mention the possibility of solar-cell electricity for rural domestic lighting. Solar cell technology is highly advanced and presently solar cells are expensive, about US \$10 per peak watt (Rs. 160/- at current exchange rates). These costs are dropping and there are many predictions which forecast around \$1.00 per peak watt within 7 or 8 years. Where solar cells are to be used for lighting, the arrangements would need a storage battery and preferably an inverter to raise the low voltage DC to a high voltage AC, enabling the lighting of efficient fluorescent lamps. Such a system can have simplifications in safety and in wiring, with the choice of appropriate voltages and/or use of portable lamps. When these are designed in an integrated manner as an efficient source and utilization package, the possibility of cost competitiveness in the next few years becomes real. Because distribution lines, service connections, meters etc. which an electricity supply authority has to install are eliminated, for small lighting requirements (e.g. 20 watts per house) the solar cell lighting is a worth-while option for early consideration. If test-trials prove successful, policy tools could be used to implement a desired extent of the usage of above.

Nuclear energy is no longer a non-traditional energy in the world. To Sri Lanka, however, it is still non-traditional. Due to time lags between decision and completion, it cannot be used in Sri Lanka within the next 10 years. Further, the electricity demand in the next 10 years will not be high enough to support a large enough nuclear Power Plant of economical size. Nuclear power and energy should be critically viewed for a period beyond 10 years.

The preceding paragraphs of this section have shown that energy economies can be accomplished in many ways. The quantitative extent of economies possible over the next 10 to 15 years should be worked out carefully after detailed collection of data and analysis. The changes of the "type of energy" in different applications in order to match with "quality of energy" and "resource availability" were discussed in the earlier Section. The feasible shifts in

energy usage pattern too should be quantitatively estimated. Both economies as well as desirable shifts in the type of energy usage can be made to occur through use of forcing functions which may be pricing, incentives, penalties, physical controls, propaganda etc. Prior to application of forcing functions, goals of energy utilization as well as production in overall forms, consistent with National growth rates, should be worked out. The total energy goals or targets should be subdivided into targets in the different types, such as electricity, oil, firewood, paddy husk etc. After definition of such targets, forcing function should be used to drive the different types of energy consumptions and production towards such targets. Of course the targets are not deterministically fixed due to national and international changes; they must be reviewed periodically and changed if desirable.

In summary, the view advanced here is that independent demand predictions followed by energy supply plans worked out to match such demands, are not appropriate. For example an electricity power and energy demand plan prepared in isolation, and a pursuit to install power plants to match such demands, cannot be optimal. This will equally apply to oil, firewood and other sources. **Energy demand must be managed in an appropriate manner, with economies as well as transfers from one type to another.** A proper demand and supply over the long term then becomes a trajectory/ (followed in energy state (x) and time (t) controlled carefully by forcing functions (u) which are policy tools. If optimal control modelling is desired for mathematical and computer analysis, the 'goals' or 'targets' in energy types may be viewed not as rigid targets but boundaries on state variables. The trajectory followed itself must be optimal. The objective would be the minimization of a cost function integrated over time. Due to the discontinuous nature of functions expected, and stochastic nature of certain variables, Bellman's dynamic programming techniques may be the most appropriate for a practical solution.)

Energy Goals

The overall growth of energy requirements depends on population growth, economic and industrial

growth and many other macro and micro factors. The government policies do have a large bearing. To make a reasonable overall assessment of energy goals for a 10 to 15 year period considerably more systematic data collection than available today is required. Further, there should be a will and ability to follow a pre-determined energy management path through appropriate institutional arrangements.

Due to the absence of many of the pre-requisites, the attempt made here is to identify very approximately the goal areas desirable in 10 years time. The goals defined here should only be viewed as trial targets; they must be changed with the accumulation and analysis of substantial data. They must further be revised as time unfolds.

The approximate (assessed) annual energy supply figures for 1981 are as follows:

SOURCE	Million Tons	GWh e. r.	%
Hydro-electricity	—	1600	15.7
Oil Products (inclusive of requirements for oil based electricity generation)	1.0	3000	29.3
Firewood	4.5	5625	55.0
Other (paddy husk, wind, bio gas etc.)			negligible
Total		10225	100.00

Table 2. Approximate Assessed Annual Supply for 1981

(Assessment made in June 1981)

An Energy Management Plan

For growth of industry and economy, the growth of total useful energy is essential. In Section 3, the quality matching and resource matching aspects were discussed. Section 4 discussed the savings and non-traditional energy possibilities. With the aid of the principles brought out in these discussions and present data available, the following assessments are arrived at.

(a) There are no known oil, coal or gas resources in Sri Lanka. It is there-

fore desirable, particularly in the context of high and rapidly rising oil prices, to keep oil consumption figures low. As it is difficult to reduce the consumption levels without adversely affecting transport, industry and economy, an attempt should be made to keep levels close to the present values (3000 GWh e.r.). The³ Dr. Jayatilake Committee report's value of 3150 GWh. e.r. is tentatively accepted here for the year 1990.

(b) The potential large scale hydro electricity that can be ultimately developed is approx. 6500 GWh annually.² Large extents of capital have to be found to finance hydro development work. Further, time lags of the order of 7 years are required for most hydro power plant investigation, design, construction and commissioning. Considering the present state of these with regard to prospective hydro-power plants, the maximum deve-

lopment possible by year 1990 is about 4000 GWh. This extent of energy can be consumed, particularly in view of the fact that hydro-electricity is the only indigenous source which can cover "very high" and "high" quality requirements of energy.

(c) Increases in firewood consumption are not desirable until large reforestation and a-forestation programmes are well on the way. According to Industrial Development Board sources, energy efficient

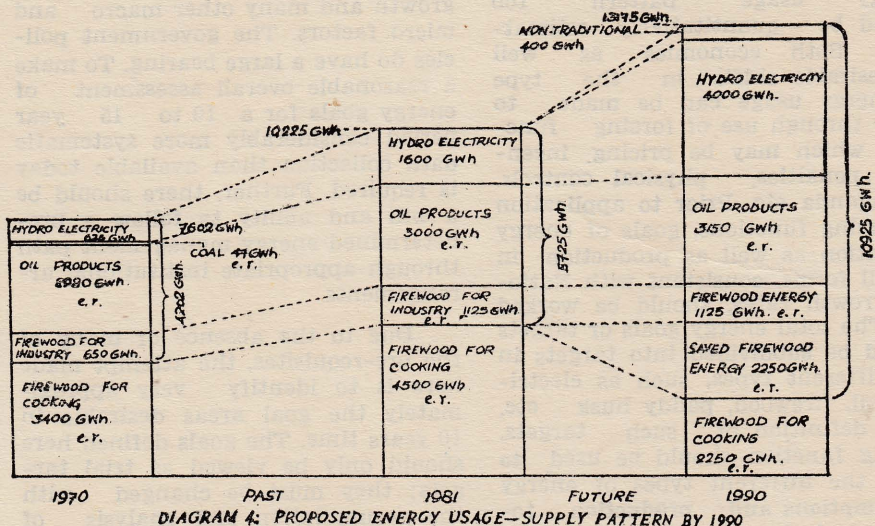
hearths can bring down the domestic sector firewood requirements (cooking needs) to about one third. If this were done and the same firewood consumption is allowed with a backing of planned forest growth, the balance two-thirds of the domestic share of fire-wood can be channelled for medium and low quality heat requirements of industry. If a conservative figure of half the domestic share of firewood as available for channelling is assumed, i.e. about 2.0 million tonnes a year is assumed, the energy available through this would amount to about 2500 GWh. e.r. This will be called "saved firewood energy" for convenience (see diagram 4).

- (d) Non-traditional energy sources such as paddy-husk, saw-dust etc. can be channelled for use fairly easily. A small extent of wind energy, mini-hydro, bio-gas, solar heating and solar electricity may also become possible by the year 1990. The total of such energies could be raised to the region of 400 GWh. e.r. with moderate use of policy tools.

The above assessments are summarised and exhibited in diagram 4. Past energy consumption pattern (1970) is also given for comparison purposes. The connecting lines are for visualization only and should not be used for interpolation.

Features of the Illustrated Plan

It will be seen that the suggested redistribution of types of energy by 1990 leaves oil consumption rather static; additional energy requirements so vital for national growth are proposed from hydro electricity and firewood. The fire-wood consumption is also kept at the same level as in 1981, though more use is made of its energy. Other economies and more efficient use in most spheres will also need promotion. The result is the release of approximately 10925 GWh by 1990 (as compared with 5725 GWh in 1981) for industrial and commercial growth, provided future systems are planned and operated in an energy economic manner. However, the target values given here should only be considered as trial targets and im-



proved upon as stated in the Section on "Energy Goals". The prime purpose of the present exercise has been to illustrate the principles and methodology.

Summary and Conclusions

The demand on energy can be classified into different types, such as electricity, oil, firewood etc. It is possible to shift the energy demand from one type to another, within certain limits, by the use of policy tools or "forcing functions" such as pricing, propaganda etc. The policy tools could also be used to promote economic use of energy, to reduce wastage, and to bring in desirable non-traditional forms of energy sources.

In this frame-work, demand prediction on an isolated sector of energy such as electricity or oil ceases to have a meaning. Demand management in all sectors in an integrated manner has become necessary, particularly in the context of very rapidly rising energy costs. Towards this end, demand and source matching according to "quality of energy" and according to "resources availability" is attempted. Once target areas of energy types are identified, forcing functions should be used to drive the different types of energy consumptions and productions towards such targets.

An attempt has been made to apply the above principles in the Sri Lanka context. With efficient use of energy, demand shifting and proper management, it appears that

substantial energies can be allocated for industrial and commercial growth. It should be possible to achieve this without increasing oil consumption or firewood to any marked degree though transport requirements will increase. To a large extent, more efficient use of firewood and other sources, together with matching by quality of energy and resource availability would be the key to this achievement. In order to attain this, policy tools must be judiciously applied and changes caused to happen both in demand and supply according to an optimum plan.

Further, collection of data and analysis is necessary and based on such information the optimum targets of different types of energy should be refined and progressively updated.

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The Equality of Educational Opportunity to Study Science at Senior Secondary Schools in Sri Lanka — A Quantitative Assessment

Jayampati Wanasinghe

It is generally accepted that disparities exist in the educational facilities and opportunities available between the various regions of the country. In this paper, however, Dr. Wanasinghe of the Faculty of Education, University of Colombo, attempts to establish on a scientific basis the level of disparities between the different regions. He uses five distinct criteria — student enrolment, availability of science graduates, provision of laboratories, and of libraries, and pupil-teacher ratio — in order to make a quantitative assessment of the equality of educational opportunities to study science at senior secondary schools in Sri Lanka. The results seen under each criterion indicate the existing levels of disparities. In his assessment he also lists some of the major historical, geographical and socio-economic factors that have contributed to this situation.

This paper measures through an index, using the five criteria, the degree of exposure to science education and helps to identify those regions that need priority attention. A basic proposal centres on the provision to under-developed schools and regions of priority attention, for receiving better facilities.

The Economic Review is publishing a series of studies on socio-economic aspects of education. This paper, which is one in this series, looks at regional variations. The articles to follow will look at access to education on the basis of class as well as on the basis of sex. It should be therefore emphasised that this paper — and others of the series taken in isolation — does not present a complete picture on access to education.

The educational system during the British period centred around the elitist concept of education. It was indeed a two ladder system. A very insignificant minority who could afford to pay high fees had access to developed urban schools, higher educational opportunities and therefore to remunerative and prestigious jobs. The vernacular schools, located mainly in the rural areas, were planned for the poor and imparted an education free of charge. Further, the language of the administration of the country was English and higher education was not offered in the vernacular languages. This closed all avenues of social and economic advancement for those who studied in the vernacular schools. The most they could aspire to was to become teachers in the same type of schools. Thus two distinct sub cultures, based on the kind of education received, existed in the country. The social gap between these two groups was reinforced by the fact that an English education was an "escape from caste, from village, from insecurity and from low to better economic levels."¹ The

mass of the population, especially the poor, constantly agitated to remove this social inequality.

As a partial answer to this problem a scheme of free education from the kindergarten to the University was inaugurated in 1945. The main objective of this scheme was to offer an education of high quality to the underprivileged child. Such educational reforms as the introduction of Central Schools, the abolition of denominational schools, the switch over of the medium of instruction, extension of teaching of science to all junior secondary schools, were all aimed at promoting the welfare of the underprivileged with the major aim of achieving equality of educational opportunity.

Even to date the ideology of equality of educational opportunity has been one of the main factors in determining educational policy. All educational commissions since independence advocated the achievement of equality of educational opportunity. The educational reforms of 1972 set out to achieve this major aim of "furthering the concept of

equality of educational opportunity by reducing area-wise imbalances in the provision of educational facilities as well as other steps such as changes in the structure of the school system." In this study an attempt is made to assess how far Sri Lanka has achieved this aim in the area of science education at the Senior Secondary level.

The data for this study was obtained from the Ministry of Education. All quantitative data pertaining to this study refers to the year 1977. This year is very significant for two main reasons.

The five year educational plan ended in 1977. The change of government in 1977 led to the introduction of new educational policies. The performance of the educational system in this field of equality of educational opportunity after 1977 can therefore be judged with respect to the situation that existed in 1977.

Equality of educational opportunity is usually discussed under two major headings 'initial equality' and 'equality of outcome'. G. H. Bantock² compares 'initial equality' to the fair start in a race. "The runners are allocated to their lanes. The judge's concern is, on the one hand, how they finish but, on the other, whether or not they all got a fair start".³ In the field of education this essentially means equal access or equal exposure to a uniform kind of secondary education. In the Newsom Report this concept is interpreted to mean that "all children should have an equal opportunity of acquiring intelligence."⁴

"Equality of outcomes' refers to 'giving people a fairer chance to achieve a kind of terminal equality — equality of outcome.'⁵ Thus the aim of the school is to arrive at the same outcome somehow. According to Bantock what is sought in this context is "homogenisation in terms of culture, achievement and experience."⁶ No doubt, such a system may be beyond achievement specially in the Sri Lankan context. Mac Beath commenting on this concept states that "such a possibility may well be the most millenarian fantasy of them all"⁷

In this study equality of educational opportunity is taken to mean 'initial equality'. Initial equality in essence refers to 'equality of exposure.' James Coleman puts forward the underlying assumptions of this concept thus: 'If we start from the assumption that equality can be

realised in terms of equal exposure of all children to what goes on in school, it then becomes incumbent on the pupil to use the opportunity given him. Responsibility for achievement or non-achievement, within this liberal framework, may be seen to rest entirely on the pupil.¹⁸

Access or exposure to science education is directly linked to educational provision each school offers. Educational provision at G.C.E. (A.L) in science education in the Sri Lankan context depends on five distinct factors. These are—

- (1) availability of courses in Science at the G.C.E. (A.L.)
- (2) availability of qualified staff to teach Science subjects at G. C. E. (A.L.)
- (3) availability of laboratories to teach science upto G.C.E. (A.L.)
- (4) availability of libraries
- (5) availability of manageable classes conducive to effective learning.

Criteria Used in the Assessment

Criteria for educational provision used in this assessment are derived from the above five factors. These are —

- (1) Student enrolment in science (enrolment per 1000 population)
- (2) Number of Science graduates/100,000 population
- (3) Number of G.C.E. (A.L.) laboratories/100,000 population
- (4) Number of libraries/100,000 population
- (5) Number of pupils/teacher.

In this study it is hypothesised that equality of educational opportunity in science education varies from educational region to region.

These five criteria are used to arrive at a single index for each educational region that indicates equality of educational opportunity.

The educational regions for this study are those under the control of a Regional Director of Education. In 1977, there were 30 such regions. Most of these regions are identical with the administrative districts. However some have been subdivided into sub-regions such as Gampaha and Minuwangoda. As some of the data, such as population, necessary for this study are available only on an administrative district basis the writer combined a few educational regions to coincide with the administrative districts. Thus the number of educational regions was reduced to 23.

A significant educational change introduced in 1977 was the abolition of N. C. G. E. and HNCE examinations. The GCE (O.L.) and GCE (A.L.) were reintroduced. Accordingly, students who had passed the NCGE and were studying in Grade 10 were absorbed into G.C.E. (A.L.) classes. For the computation, therefore, the total number of students in the Senior Secondary School was taken as the total number of students in Grades 10, 11 and 12 during the year 1977.

Student Enrolment

Table 1 gives the student enrolment in G.C.E. (A.L.) classes in Science subjects

For the whole island, the enrolment in educational regions ranged from 0.627 to 11.23 per thousand population. Moneragala had the lowest value of 0.627 whereas Jaffna had the highest with a value of

11.23. This means that Jaffna had 17.9 times the enrolment of Moneragala. The mean enrolment for all regions was 3.32 per thousand. Out of the 23 educational regions the enrolment in 13 regions fell below the mean. Moneragala and Anuradhapura had enrolments of less than 1 per thousand population. The enrolments for Ratnapura, Bandarawela, Polonnaruwa and Nuwara Elya regions had values between 1 and 2 per thousand.

Distribution of Science Graduates

The distribution of Science Graduates by educational region is given in Table 1. The Moneragala region had the lowest number of Science graduates with an index of 1.61 graduates/100,000 while Jaffna Educational region had the highest index of 43.30 per 100,000 population. The mean index for all educational regions was 9.20. Fifteen educational regions had indices below the mean. Jaffna had 26.89 times that of Moneragala. Colombo North and South with a high concentration of developed schools had indices of 8.11 and 12.60 respectively. We may therefore conclude that Jaffna had an index of 3.43 times that of Colombo South and 5.33 times that of Colombo North.

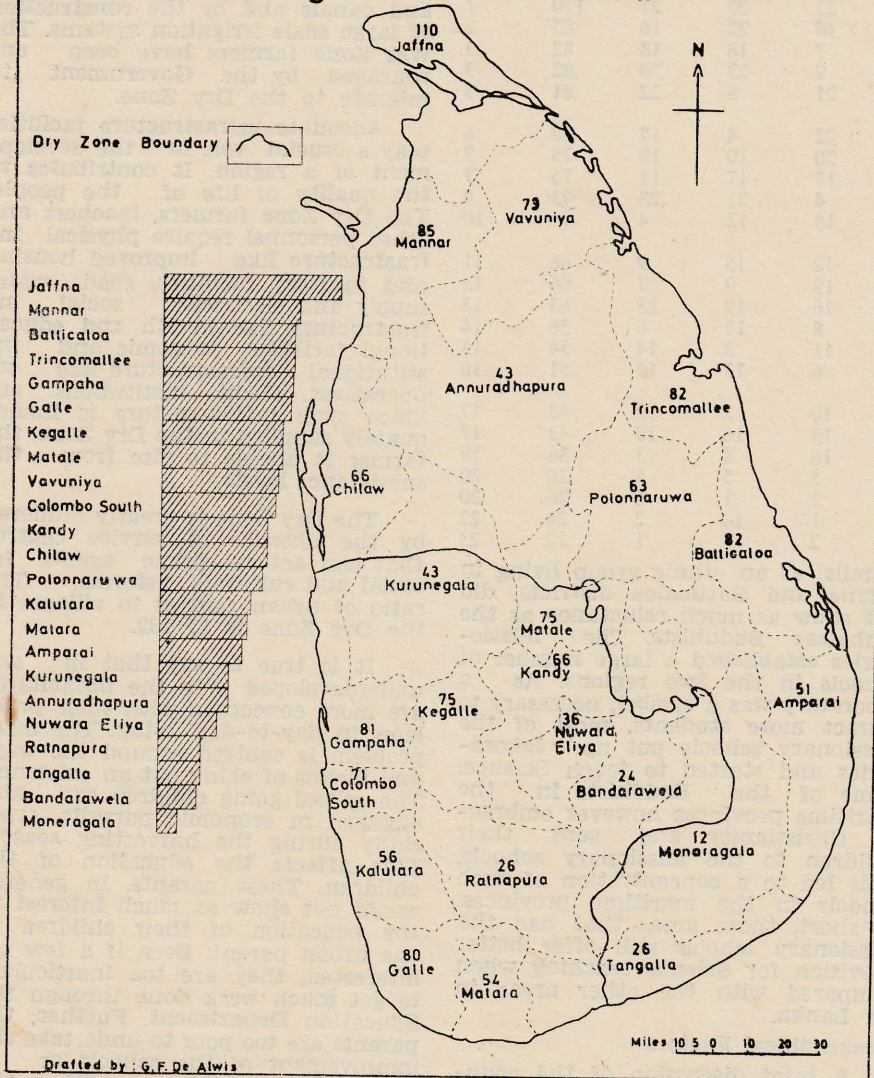
Distribution of Science Laboratories

The distribution of approved Science laboratories is given in Table 1. There was a wide variation in the provision of laboratories amongst the regions. Bandarawela occupied one extreme with only 9.64 laboratories/100,000 population while Jaffna occupied the other extreme with 30.55. The statistics brought out the stark fact that the

Table 1 VALUE UNDER THE FIVE CRITERIA BY EDUCATIONAL REGION

Educational Regions	Population in .000's	Student enrolment per 1000 population	Sc. graduates per 100,000 population	Science Laboratories per 100,000 population	Pupils/Teachers	Libraries per 100,000 population
1. Colombo South—Homagama	2,070	5.38	12.60	16.18	42.68	4.58
2. Gampaha	1,035	4.88	8.11	23.18	60.23	9.56
Minuwangoda						
3. Kalutara	803	3.70	8.21	14.81	45.03	5.97
4. Kandy	1,315	3.43	9.80	15.66	35.00	6.23
5. Matale	375	3.20	10.40	17.33	30.84	6.93
6. Nuwara Eliya	499	1.33	2.80	17.63	47.50	4.40
7. Galle	803	5.96	8.96	23.66	66.52	8.46
8. Matara	640	3.89	5.46	15.31	71.20	7.38
9. Tangalle	398	2.50	3.26	10.30	76.76	5.52
10. Jaffna	769	11.23	43.30	30.55	25.94	9.36
11. Mannar	95	2.75	15.78	15.78	17.33	8.42
12. Vavuniya	120	2.43	12.50	11.66	19.60	11.66
13. Batticaloa	313	4.02	13.75	14.05	29.32	8.62
14. Amparia	334	2.45	5.98	13.72	41.05	7.78
Kalmunai						
15. Trincomalee	234	2.47	14.95	14.95	16.54	8.97
16. Kurunegala	1,170	3.06	4.10	15.12	74.64	7.00
17. Chilaw	450	3.84	8.22	19.33	46.81	5.77
18. Anuradhapura	489	0.89	2.65	15.74	33.69	6.74
19. Polonnaruwa	182	1.62	6.04	17.05	26.90	7.14
20. Moneragala	247	1.39	1.61	9.71	38.75	3.23
21. Bandarawela	705	0.62	2.69	9.64	51.78	3.26
22. Ratnapura	758	1.83	2.90	12.53	63.54	5.01
23. Kegalle	716	3.50	7.68	21.22	45.63	8.65

Access to Science Education in the Educational Regions of Sri Lanka



Kurunegala, Bandarawela and Ratnapura had ratios of more than 60 degrees. It would therefore follow that in these regions there was a very severe dearth of Science graduates to man the G.C.E. (A.L.) Science classes. Ratios as high as 60 and above definitely indicate that there were some schools with approved G.C.E. (A.L.) classes without a single graduate to teach some Science subjects. This dearth was not so acutely felt in the educational regions of Jaffna, Mannar, Vavuniya, Batticaloa and Trincomalee. These regions had ratios below 29.32.

Educational Priority Areas

The five criteria—student enrolment, availability of Science graduates, provision of laboratories and libraries, and pupils teacher ratio—have been used in this study to show that there were wide regional imbalances in the field of Science education. The results under each criterion indicate that there existed a wide disparity between the regions. In this study these five criteria are used to arrive at a single index for each educational region that would measure the degree of exposure to Science education. This single index can therefore be used to rank in order the educational regions on the basis of the degree of equality of educational opportunity. The region at the top of the list would have the highest 'exposure' and the region at the bottom of the list would have the least exposure. This single index for each region enables us to identify the educational regions that should be given priority if equality of educational opportunity is to be achieved.

To arrive at this ranking order, the indices under the five criteria are utilised. The results under every 'criteria index' is first rank ordered. Scores are assigned from 1 to 23 among the 23 regions. The highest rank gets a score of 23, the next 22 and so on upto the lowest which gets a score of 1. Table 2 gives the scores for each region. Once the scores are known, the total score for a given region indicates the composite score arising out of the five criteria. The region with the minimum score comes first in the priority list. It is therefore possible to rank order the regions in terms of educational priority.

Table 2 gives the individual score under each criterion, total score and the rank order position for each educational region.

In this study physical quantities have been used as criteria in arriving at a single index. Therefore, this single index falls under a ratio scale. Hence, quantitative compari-

educationally developed regions such as Jaffna, Colombo and Galle had relatively high indices. Bandarawela, Moneragala, Tangalle and Vavuniya districts, which are in the Dry Zone of Sri Lanka, came at the bottom of the list. As many as 15 educational regions had indices less than the mean of 16.30.

Distribution of Libraries

Table 1 indicates the distribution of approved libraries in the educational regions. The mean for all educational regions was 6.97 libraries/100,000. The minimum of 3.26 was for Bandarawela. Vavuniya had the highest index of 11.66. However 19 regions had values between 5 and 9. Moneragala, Bandarawela and Nuwara Eliya once again occupied

a unique place in the sense that they had indices of comparatively low values.

Pupils/teacher ratio

The wide disparity of this ratio amongst the educational regions was clearly indicated in Table 1. Trincomalee had 16.54 pupils per Science teacher whereas for Tangalla this ratio was 76.76. The mean for all regions was 43.79. A relatively high value for the mean indicated that there was a severe dearth of science graduates in the majority of educational regions. Eleven regions had, on the average, more than 43 pupils per Science graduate. Colombo North, Matara, Galle, Tangalla,

Table 2—SCROES UNDER EACH CRITERIA CLASSIFIED ACCORDING TO EDUCATIONAL REGION

Educational Region	Enrolment	Science Graduates	Science Laboratories	Pupil Teachers	Libraries	Total Score	Rank
1. Jaffna	23	23	23	20	21	110	1
2. Mannar	11	22	14	22	16	85	2
3. Batticaloa	19	20	7	18	18	82	3
4. Trincomalee	9	21	9	23	20	82	3
5. Gampaha	20	12	21	6	22	81	5
Minuwangoda							
6. Galle	22	15	22	4	17	80	6
7. Kegalle	15	11	20	10	19	75	7
8. Matale	13	17	17	17	11	75	7
9. Vavuniya	7	18	4	21	23	73	9
10. Colombo South	21	19	15	12	4	71	10
Homagama							
11. Kandy	14	16	12	15	9	66	11
12. Chilaw	17	14	19	9	7	66	11
13. Polonnaruwa	5	10	16	19	13	63	13
14. Kalutara	16	13	8	11	8	56	14
15. Matara	18	8	11	3	14	54	15
16. Amparai	8	9	6	13	15	51	16
Kalmunai							
17. Kurunegala	12	7	10	2	12	43	17
18. Anuradhapura	2	2	13	16	10	43	17
19. Nuwara Eliya	3	4	18	8	3	36	19
20. Ratnapura	6	5	5	5	5	26	20
21. Tangalle	10	6	3	1	6	26	20
22. Bandarawela	4	3	1	14	2	24	22
23. Moneragala	1	1	2	7	1	12	23

sions between any two educational regions are possible. These comparisons bring out striking and alarming disparities of educational opportunity between the educational regions. Thus, in 1977, a child in Jaffna region enjoyed as much as 9.16 times the educational opportunity of a child studying Science in the Moneragala region. Table 3 below compares the opportunities offered between some regions.

TABLE 3

1. Jaffna: Moneragala	9.16:1
2. Colombo North: Moneragala	6.75:1
3. Jaffna: Bandarawela	4.58:1
4. Jaffna: Colombo North	1.35:1
5. Jaffna: Colombo South	1.54:1
6. Colombo North: Ratnapura	3.11:1

MAJOR FACTORS THAT CONTRIBUTED TO THE PRESENT SITUATION

The present system of Science education in Sri Lanka is largely a product of historical and geographical factors.

Historical Factors

From this analysis one can infer that students are best exposed to Science education in regions of Jaffna, Colombo, Kalutara, Chilaw, Batticaloa, Galle and Matara. Jaffna takes the most prominent place coming at the top of the list. These can be attributed to the historical factors in the development of education in Sri Lanka. The western powers established missionary schools in the maritime provinces. When the British captured Sri Lanka, they inherited a network of missionary schools and Governor Robert Brownrigg expanded this network. The Buddhists opposed this move and showed great reluctance to send their children to these schools. The

Tamils, as an ethnic group living in Jaffna and Batticaloa districts, did not show as much reluctance as the Sinhalese Buddhists. The missionaries established a large number of schools in the two regions. As a laboratory was a symbol, necessary to attract more students, most of the missionary schools put up laboratories and started to teach Science. Some of the Buddhists in the maritime provinces however embraced Christianity and sent their children to the missionary schools. This led to a concentration of such schools in the maritime provinces. In short, those areas that had the missionary schools still offer better provision for Science teaching when compared with the other areas in Sri Lanka.

Geographical Factors

A brief discussion of the country's geographical background and the human responses to it brings out the influence of the geographical factors on the educational system.

When compared to the Wet Zone, the physical environment of the Dry Zone districts is not attractive to human settlement. The rainfall is variable and unreliable. It is concentrated in a few months of the year. Due to high temperature and high winds there is considerable loss of water from rivers, tanks and canals. The geology of the Dry Zone increases this problem of water supply. Unlike the Jaffna Peninsula which has an abundant supply of underground water stored in the limestone, the greater part of the Dry Zone is underlain by impermeable crystalline rocks.

The high temperature coupled with the high relative humidity has

made living in the Dry Zone thermally uncomfortable for many.

The problem of water supply for agriculture has been solved to some extent by the repairing of old tanks and canals and by the construction of large scale irrigation systems. The Wet Zone farmers have been encouraged by the Government to migrate to the Dry Zone.

Adequate infrastructure facilities play a crucial role in the development of a region. It contributes to the quality of life of the people. The Dry Zone farmers, teachers and other personnel require physical infrastructure like improved housing and sanitary facilities, roads, water supply and electricity; social infrastructure like health and educational facilities; economic and institutional infrastructure like co-operatives, credit institutions etc. Since such infrastructure is inadequately supplied in the Dry Zone, the farmer is unable to rise from the subsistence level.

The Dry Zone is greatly hindered by the absence of service centres that can act as prime agents for social and cultural reforms. The ratio of urban centres to villages in the Dry Zone is 1: 232.

It is true to say that in any underdeveloped area the inhabitants are more concerned with their problems in day-to-day living. The main problem is centred around the ways and means of eking out an existence. The school going children are also engaged in economic pursuits, especially during the harvesting season. This affects the education of the children. These parents, in general, would not show as much interest in the education of their children as the urban parent. Even if a few are interested, they are too inarticulate to get much work done through the Education Department. Further, the parents are too poor to undertake the improvement of the schools or to provide their children with the facilities available to children in more developed areas.

In the Dry Zone areas the teacher shortage is a permanent feature. There have been instances where some schools with laboratory facilities have not taught Science for over a year because of the lack of Science teachers. This has to be expected as the teachers are not, in general, provided with living quarters in these areas. Suitable houses in most areas are not available. It is particularly difficult to find suitable accommodation for an unmarried lady teacher. Further, lack of hospitals within easy reach, the difficulty of getting the teachers' children properly educated and the non-availability of an efficient transport system add to the difficulties encountered by the teachers.

There is hardly any attractive incentive for a teacher to work in the Dry Zone areas. All teachers with the same academic qualifications are placed on the same salary scale irrespective of whether they serve in a difficult area or not. In the field of Science, the educated, experienced and efficient teacher can always find schools in urban areas or employment in other sectors.

The Department of Education has imposed a general rule that every teacher has to work at least two years in a difficult area. The general pattern is for the teacher to serve this period without doing any hard and honest work. In fact teachers consider working in difficult areas more a punishment. Only a very few stay on after two years. Therefore there is a constant change of teachers in the schools especially in the Dry Zone areas. Needless to say, this type of educational set-up would not bring the desired educational outcomes.

Social Beliefs

In the Sri Lankan society inequality is accepted as a way of life. Belief in Karma however provides a psychological cushion to face the inevitable situations arising as a result of low socio-economic conditions. This state of affairs has led to the preservation of the notion that inequalities are natural. Effective agitation for social change therefore will not emerge from the under-privileged. Without effective agitation political leaders generally turn a blind eye to the problem of inequality. In the face of other demands, especially from the privileged groups, governments find that the neglect of education in underprivileged areas creates fewer difficulties.

Superior Schools

It is a well-known fact that the system of education discriminates in the interests of the privileged. In fact the inequality of education between the privileged and the under-privileged is widening rapidly.

For example the resources spent on the development of Ananda College in the city of Colombo during the last two and a half decades are probably more than that spent on Hambantota District during the last century.

In the prevailing system of free education in Sri Lanka, there exists a net work of superior government schools situated mainly in the urban areas. In Colombo—Royal, Ananda, Nalanda, Visakha, D. S. Senanayake, Devi Balika are only a few that belong to this category of schools. These schools are very well equipped to teach Science. They are perpetuating the elitism in the education system.

Although on paper the opportunity of accessibility to these schools, especially at the lower level is based on the area rule, admissions are however made on the 'aristocratic criterion'. Middle and Upper Middle class parents get their children admitted to these schools by adopting various irregular methods. These parents are influential economically, socially and politically. They ensure that the best of education is given to their children by getting the government in power to divert more resources to these schools.

These superior schools have the best of the qualified and experienced teachers; fully equipped laboratory complexes, library facilities and other auxiliary aids for effective teaching. It is therefore true to say that the allocation of resources for Science education is largely determined by the needs of these superior schools. Thus an anomalous situation has arisen. Although every government since Independence professed to be progressive by moving towards equality of educational opportunity, it was seen that they are retrogressive in their action. In the tug of war between equality of educational opportunity and quality the latter has always won.

FUTURE ACTION

If equality of educational opportunity is to be achieved at least asymptotically, the government will have to initiate revolutionary measures without much delay. In essence this would amount to a reversal of the policies and their underlying assumptions so far attempted by the government.

Even today an 'elitist system' of education, especially in the field of Science Education is prevailing in the country. In the long term, policies will have to be adopted to change this to a 'mass system' which caters to a wider spectrum of students. This would mean a change in objectives, structure, content, methodology, attitudes and prestige styles that worked well for an elitist system.

The Plowden Report in England has offered a new approach to alleviate the problem of inequality in the schools. It is termed "positive discrimination" which means a diversion of educational resources and

expertise away from the developed and privileged regions to the underdeveloped. For this purpose it is essential to identify the developed and underdeveloped educational regions in Sri Lanka.

It has to be accepted that the Department of Education will not have the resources to develop all the regions simultaneously. A priority list of regions will have to be established. This study puts forward such a priority list. It is possible to rank order. The regions according to priority. The education region with the minimum total score comes first in the priority list, viz. Monaragala, Bandarawela comes second and Ratnapura third and so on.

A short term workable solution is to establish "centres of excellence" in the rural and underdeveloped areas. These schools should have all the facilities including modern laboratories, teachers' quarters etc. The teachers' quarters should be provided with modern conveniences. This facility coupled with an incentive bonus for working in difficult areas will ensure a supply of experienced and qualified teachers. The Kolmogorov schools which are the "centres of excellence" for science and Mathematics in the USSR work somewhat on these lines.

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