MEDIUM TERM PLAN 1977/81

SECTORAL COMMITTEE ON INDUSTRIES

A REPORT OF A SUB-COMMITTEE ON SCIENCE, TECHNOLOGY AND ENVIRONMENT

Our Ref: 1/2/28

NATIONAL SCIENCE COUNCIL OF SRI LANKA,
47/5, Maitland Place,
Colombo 7.

1977-06-27

Mr. L.N.de L. Bandaranaike,
Secretary,
Ministry of Industries & Scientific Affairs,
48, Sri Jinaratana Road,
Colombo 2.

Dear Sir:

MEDIUM TERM PLAN 1977-81
SECTORAL COMMITTEE ON INDUSTRIES
SUB-COMMITTEE ON SCIENCE, TECHNOLOGY & ENVIRONMENT

At the first meeting of our Committee, it was decided that the report of this Committee should consist of two parts, namely, (a) a statement regarding the long-term aspects and the importance of a Science and Technology Policy, and (b) a short-term five year Programme (1977/81) of the Research and Development efforts needed to implement the proposed industrial programme.

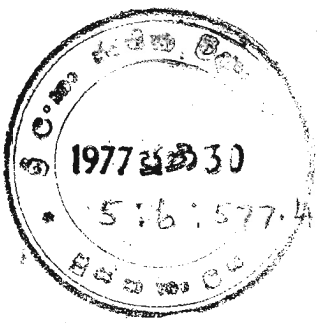
We have given in the report, a statement regarding (a). As far as (b) is concerned, we have addressed all the other Sub-committees and as yet, have had no response from them. We have also addressed the Heads of the scientific institutions under the Ministry of Industries & Scientific Affairs and whatever comments we received are in Appendix I of this report.

We were given a deadline of 30th April 1977 to submit our report and even though this was extended till 30th June 1977, we have not been able, due to various circumstances beyond our control, to submit as comprehensive a report as we would have liked. However, in the circumstances, we are submitting this report and we hope that it would be useful to you in drawing up the Medium Term Plan for the whole Ministry.

Yours faithfully,

G.C.N. Jayadeva

Convenor and
Secretary-General
NATIONAL SCIENCE COUNCIL



NA-136

R. NO. ~~188~~

Members Of The Committee

G.C.N. Jayasuriya - Secretary-General, National Science Council of Sri Lanka - Chairman

C. Abeysekera - Director-General, National Institute of Management

R.C. de Silva - Director (Scientific Affairs), Ministry of Industries and Scientific Affairs

S.F. Laurentius - Director, Ceylon Institute of Scientific and Industrial Research

B.C. Perera - Chairman, Industrial Development Board

D.J.A.C. Hapuarachchi - Actg. Director, Geological Survey Department

D.G.P. Seneviratne -Director (Industrial Policy), Ministry of Industries and Scientific Affairs

U.S. Kuruppu - President, Katubedde Campus

V.C.B. Unantenna - Director, Academy of Administrative Studies

K.K.Y.W. Perera - Chairman, National Engineering Research and Development Centre

K.K. Wanigatunge - Asst. Director, National Apprenticeship Board

S.K. Iyer - General Manager, Lambretta Ceylon Ltd.

D. Amarasinghe - Director of Education (Technical Education), Ministry of Education

A.W.R. Joachim - Member, Water Resources Board

Much has been said and written during the past two decades about the application of Science and Technology to the process of development in the developing countries. World organizations like the U.N. and its agencies, the International Council of Scientific Unions and many others have also put in a lot of effort towards this area of activity. However, little has been achieved in the field of Science and Technology in the developing countries so far. If we take a look at both the Western industrialized countries as well as the socialist countries, it would not be too difficult to see the emphasis that their leaders and their ideologies place on the role and importance of Science in development. They have recognized that Science is an essential ingredient for economic growth. On the other hand, in the developing

countries (of course there are exceptions) very little has been done on developing capabilities in Science and Technology, aimed towards the ultimate goal of achieving self-reliance in this area of activity. Sri Lanka, we feel, also falls into this category.

Since independence in 1948, a fair amount of effort has gone into Science and Technology development in this country. However, most of these developments have been on an ad-hoc basis and not through any planned effort. There are a number of institutions established in this country for Scientific and Technology development. We have several research institutes, six campuses of our university and other institutions like the National Science Council of Sri Lanka, the Sri Lanka Association for the Advancement of Science, the Industrial Development Board, the National Engineering Research Development Centre, the Atomic Energy Authority and the Bureau of Ceylon Standards and the recently formed National Academy of Sciences, to mention a few. However, no government, since independence, has made a Science Policy Statement in Sri Lanka. Although there have been separate Ministries for Cultural Affairs, Social Sciences, Fisheries, Post and Telecommunication, a Ministry for Science was created only in 1968 and that too was in the form of a Ministry of Scientific Research and Housing, and in 1970, Science was brought under Industries and Scientific Affairs.

The Phrase Science and Technology is here used as in UNESCO documentation to cover a broad spectrum of activities[1]. These are:

- Research and Development (R & D): Basic research, mission-oriented research and applied research; and development. The latter term in this context refers to the utilization of research leading to the introduction of new materials, devices, products, systems and processes or the improvement of existing ones including the design and construction of prototypes and pilot plans.

- Scientific and Technological Services (STS): Geological, geophysical, meteorological and natural resource surveys; scientific standards and testing services; scientific library and information services; museums, zoological and botanical gardens; technical and scientific advisory services; and social and economic data collections such as censuses, sample surveys and their analysis.

- Creation and diffusion of Scientific and Technical skills: Scientific and Technical education at all levels (primary and secondary school, university, technology institutes, industrial training centres and in industry, field work and extension training).

- Application of Science and Technology : Rural extension, management and productivity activities, design engineering, technical consultancy and feasibility studies, project preparation, etc.

During the last two or three decades, successive governments have given priority to a centrally planned economy to achieve their social and political goals. All these plans have an implicit role for Science and Technology although there is no specific mention of it in the implementation of such plans. In the 1972/76 Plan, Science and Technology is conspicuous by its absence, although we feel that Science and Technology should be an essential input for the success of any development plan.

The National Science Council has recently undertaken a Survey on R & D Expenditure and Tables I, II, III and IV give the results. The Survey has not yet been fully completed and the figures given are only approximate and may be subject to revision when the Survey is completed. We have also given below, projected sector-wise distribution of R & D Expenditure in 1980.

Estimated G.N.P. at Constant Factor Cost (1975) = Rs.11,114.8
Estimated Expenditure on R & D (1975) = Rs.36,68 million
Percentage of G.N.P. = 0.3 %
Projected G.N.P. 1980 (Ave.increase of 3% p.a.) = Rs.12,885 million
Projected Expen. on R & D(1980) (Estimated at 0.6 % of G.N.P.) = Rs.77.3 million

Projected Sectorwise Distribution of R & D Expenditure 1980

Sector	Percentage	Amount
Agriculture (including Forestry and Fisheries)	65	50.25 m
Industry (Mining, Quarrying & Manufacturing)	14	10.82 m
Transport and Communication	3	2.32 m
Marketing, Commerce & Trade	3	2.32 m
Power and Fuel	5	3.87 m
Education (Information, Extension etc.)	5	3.87 m
Services (Family Health, Welfare etc.)	5	3.87 m
		77.32 m

It would be seen that the percentage expenditure on R & D of the G.N.P. in 1975 is 0.33. The projections for 1980 are based on the assumption that by 1980, the R & D Expenditure would have been increased to about 0.6 percent of the G.N.P. The G.N.P. for 1980 has been arrived at by assuming an average increase of 3 percent per annum. With these assumptions, the estimated amount of expenditure on R & D in 1980 would be of the order of 77 m. rupees.

GENERAL RECOMMENDATION

We are of the opinion that the time is opportune to have an apex organization for Science and Technology in Sri Lanka. This organization, among other functions, will review, monitor and co-ordinate Science and Technology activities in the country. It would also be responsible for recommending to Government the financial allocations for Science and Technology. In addition, it should undertake manpower planning.

There are three possibilities for establishing such an apex organization.

(1) The organization should be directly responsible to the Head of Government or the Cabinet of Ministers.
(2) The portfolio of Science and Technology should be coupled with that of Planning.
(3) A separate Ministry for Science and Technology should be created.

Although opinion seems to be divided as to which of these alternatives would be the most feasible, the Committee seems to feel that at the present state of the development of the country, either alternative two or three would be the most feasible, namely, the creation of either a Ministry of Planning and Science or the creation of a Ministry of Science and Technology.

SPECIFIC RECOMMENDATIONS

We recommend that during the Plan period 1977/81, an overall assessment and evaluation of the scientific and technical activity in this country be undertaken. We would recommend the establishment of a Presidential Commission for this purpose.

We recommend that in the allocation of funds, high priority should be given by government for the development of Science and Technology as this would be an essential pre-requisite for increasing agricultural productivity and industrialization in our country.

We recommend that steps be taken to generate skills and build up expertise in particular areas in which Technologies has been imported. This we feel would help build up an indegenous expertise upon which we could rely for evaluation, assessment and choice of Technologies.

We recommend that steps be taken to systematize manpower training which we feel at the moment, is done in a rather ad-hoc manner.

National priorities should be drawn up in the fields for which training is necessary abroad. Simultaneously, we feel that the allocation of funds to Universities should be increased so that we develop our own post-graduate facilities in this country. We also feel that training in the area of Technology has been neglected so far and greater emphasis should be placed on this field of training.

The Committee also feels that high priority should be taken for (a) the establishment of a Centre for the repair and maintenance of scientific equipment and (b) the establishment of a Scientific and Technical Information Centre.

We also suggest that tax relief be offered to the private sector for investment in research and development and this should be encouraged.

We also suggest that there be a ½ % cess on industrial products which could be the basis of a fund for research and development.

ENVIRONMENT

As far as the Environment is concerned, we should like to reiterate the recommendations of the Committee on Environmental Management in Sri Lanka (1973).

> "Although for the purpose of this study, we have divided the environment into various fields, it is obvious that the subject of the environment is inter-disciplinary and embrases many fields, making all such divisions purely arbitrary. Further, the environment being a multi-disciplinary subject, should be handled in its entirety. We find that a large number of Departments and Ministries handle various aspects of the environment. There is also a considerable amount of legislation for the management of the environment. We also find that decisions made by one agency could directly or indirectly affect a large

number of related or unrelated Departments or Ministries.

We recommend that steps be taken for -

(a) the conservation and prevention of erosion of soil in programmes of land clearing, settlement and agricultural production,

(b) the conservation of surface run-off water,

(c) the planned exploitation of our forests,

(d) the cultivation of medicinal plants on a systematic basis,

(e) the prevention of indiscriminate clearing of jungles without due consideration for the conservation of wild life,

(f) the proper management of inland fisheries,

(g) the prevention of over-exploitation of brakish water fisheries,

(h) the optimum utilization of non-renewable resources such as minerals,

(i) the prevention of untreated industrial waste and sewage being discharged into waterways and the ocean,

(j) the monitoring of pollution on land, in waterways and in the atmosphere,

(k) the demarcation of industrial and residential sites in urban as well as in developing rural areas,

(l) the provision of hygienic methods of sewage disposal on an island-wide basis,

(m) the eradication of slum dwellings, at least in stages,

(n) the preservation of both the natural as well as the built landscape.

Many of our environmental problems could be attributed directly or indirectly to an ever increasing population. Therefore, we must endorse all steps taken today to limit our population through family planning.

We feel that education with respect to the environment should

best begin with children. It is heartening to know that the Government's new educational reforms include environmental studies at school level. We are also of the opinion that enforcement of many of the environmental laws are made difficult because the general public is ignorant of these. Existing institutions could be put to maximum use to educate the general public. For example, the Zoological Gardens at Dehiwela would be the best place to educate people regarding wild life conservation laws. An eye-catching board or plaque in front of a cage of a protected animal, declaring it protected or threatened with extinction, could be one of the best methods of informing the general public that a particular animal should be protected.

We must stress that any steps taken at present to manage our environment will be cheaper in economic and social terms than action much later, which may be costly both in terms of money and life. To quote an instance, the 1952 smog in London killed an estimated 4,000 people. The first Clean Air Act of 1956 brought an 80% reduction in smoke emission and a 40% reduction in sulphur dioxide and cost US $ .35 cts. per head per annum.

From our studies, it becomes apparent that the existing machinery in various departments and institutions, although capable of handling many of the problems of the environment will be ineffective unless co-ordinated by a suitable central organization.

Therefore, we, finally, recommend that -

A representative Central Authority for Environmental Management be established in Sri Lanka under the Ministry of Planning and Economic Affairs.

The main functions of this Central Authority should be broadly as follows :-

(a) Co-ordination of activities with respect to the environment,

(b) Evaluation of new development projects in terms of environmental hazards and conservation of natural resources,

(c) Responsibility for formulation and implementation of legislation through appropriate agencies,

(d) Responsibility for monitoring environmental pollution and determining standards for pollutants in collaboration with the various departments and institutions concerned,

(e) Initiation, sponsorship and support of studies pertaining to the environment,

(f) Dissemination of information pertaining to the environment,

(g) Collaboration with international organizations interested in the environment.

This proposed Central Authority for Environmental Management should have statutory powers and not function only in an advisory capacity.

Implementation of legislation pertaining to the environment should be carried out through the various departments and institutions; for example, laws concerned with environmental sanitation could be enforced by local authorities, pollution monitoring could be handled by the Occupational Hygiene Laboratory of the Labour Department, etc.

If, due to the present economic situation in the country a Central Authority for Environmental Management cannot be created, we recommend, for the time being, that an existing governmental agency be entrusted with the functions that we have recommended for this Central Authority."

We also understand that recently a U.N. expert, Mr. Jack Beale has also recommended to Government a Plan of Action as regards Environmental Management, similar to what we have outlined above.

We would recommend that the proposed Central Agency for the Environment be affiliated to the new Apex Organization we proposed for Science and Technology.

We would like to recommend that this new Ministry should have

several Divisions functioning under it.

(1) A Science and Technology Division
(2) An Environment Division
(3) An Energy Division
(4) A Manpower Division
(5) A Planning and Programming Division.

We would strongly urge that at the present state of development of our country, this would seem to be the most appropriate structure.

---

1 From R.C. Desai's Draft Memorandum

APPENDIX I

INDUSTRIAL DEVELOPMENT BOARD

The Industrial Development Board, reconstituted under the Industrial Development Act No: 36 of 1969, sets out its objectives as given below:

(a) to assist in the encouragement, promotion and development of industries in Ceylon;

(b) to assist in the proper co-ordination and in the inter-related growth of all industrial undertakings in the private and public sectors of the economy of the country;

(c) to foster industrial research with the object of utilising the natural resources of Ceylon, improving the technical processes and developing appropriate technologies and equipment for local industries;

(d) to foster the export of local industrial products to overseas markets;

(e) to advise on matters relating to the promotion and development of industries in Ceylon;

(f) to render all services necessary for the benefit of industry; and

(g) to advise the Minister on all matters relating to the promotion and development of industries either on its own motion or at the request of the Minister.

Since 1970, however, on the basis of Ministerial directive, the IDB has confined its responsibilities to the promotion and development of the small scale sector which is now defined as units in which the investment in machinery and equipment does not exceed Rs. 500,000/=. However, the handloom, powerloom and textile industry and cottage industries and handicrafts have been excluded from the purview of the IDB as these are the responsibilities of the Department of Small Industries.

In the implementation of this programme of work for the promotion and development of small scale sector, the IDB undertakes the following programmes:

(1) Identification of projects and preparation of feasibility studies and project proposals.
(2) Special studies in regard to selected areas of industry.
(3) Establishment and operation of development projects.
(4) Consultancy services for the establishment of additional proved development projects for entrepreneurs.
(5) Entrepreneur development

(6) Extension services to industry.
(7) Financing of small industry
(8) Training of personnel engaged in small scale industry.
(9) Development and adaptation of machinery and equipment for the small scale sector.
(10) Marketing assistance programmes for the small scale sector.
(11) Industrial Information Service.

GEOLOGICAL SURVEY DEPARTMENT

Proposed Projects to be Undertaken by the Geological Survey Department during the period 1977 - 1981

1/ Detailed exploration, evaluation and economic feasibility studies of the Seruwila Copper Magnetite Prospect in the Trincomalee District. This project is to be undertaken with German technical assistance, and if accepted by the German authorities, work is expected to commence in 1978.

2/ Detailed regional geochemical surveys along major rivers and streams in the island with a view to detect any uranium mineralization. This project is to be undertaken with assistance from the International Atomic Energy Agency (IAEA). This project proposal has been submitted to the Sri Lanka Atomic Energy Authority. Expected date of commencement of project is 1978.

3/ The southern sector of the Eppawala Rock Phosphate deposit will be investigated in detail and will include the establishment of a ground-control grid and sub-surface investigations.

4/ Survey of sillimanite-bearing rocks with a view to extracting the mineral in connection with refractories project of the Ceramic Corporation. These surveys commenced in early 1977.

5/ Mica surveys in the Kandy, Balangoda, Maskeliya, Nuwara Eliya and Ratnapura areas with a view to locating deposits for commercial exploitation. These surveys commenced in early 1977.

6/ Study of graphite mineralization patterns at Kahatagaha, Kolongaha and Ragedera mines with a view to detect near-surface graphite veins for lateral expansion of mining activities.

7/ Re-survey of the Dediyawala Ball Clay deposit to study possible variations in the quality of the deposit. This

project commenced in early 1977 and is now underway. Further surveys for ball clays may be initiated in other parts of the Island.

8/ Surveys for feldspar deposits in the Matale District will be carried out to locate new and promising prospects in connection with a rapidly expanding ceramic industry. These surveys commenced in early 1977.

9/ A detail examination of the recently discovered corundum-bearing pegmatite in the Rupaha area will be undertaken, the mineral corundum being used as an abresive in the manufacture of grinding wheels.

10/ Surveys for beach mineral sands will be carried out along the south-eastern and north-western coasts of the Island. These surveys commenced in early 1977.

11/ A serpentinite deposit in the Udawalawe area will be brought under detail study, the main objective being the possible utilization of this deposit for the manufacture of fused magnesium phosphate.

12/ A detailed assessment of the highly aluminous shale deposits at Andigama, Tabbowa and Pallama may be undertaken from the point of view of their utilization for the extraction of alumina.

CEYLON INSTITUTE OF SCIENTIFIC AND INDUSTRIAL RESEARCH

1/ To develop new source of energy, capable of being commercially exploited, or to improve the efficiency of any existing method of energy generation/distribution and new source of proteinous and/or other nutritional food for human consumption.

2/ To conserve energy, food or any of the scarce material resources by devising new methods or processing/manufacture used in agriculture, industry, etc.

3/ To devise new or better techniques for the utilization and recycling of wastes.

4/ To devise new techniques of manufacture of production of goods which result in substantial conservation of foreign exchange by way of import substitution/export promotion.

5/ To study our plant and mineral resources with a view to provide for maximum utilization of these resources.

6/ To achieve such objectives which the prescribed authority, in its discretion, considers important for the social, economic and industrial needs of our country.

METEOROLOGY DEPARTMENT

At present, there are two projects in hand, the Agrometeorological project funded by UNDP and CFTC and the Swiss aided Meteorological Telecommunication project. These projects are expected to be completed during this period. A third project to improve the upper air observational programme will be undertaken soon. This project comes under the WMO/VAP Scheme and is supported by the Indian Government.

New Proposals

(1) Library : The department is lacking in proper library facilities. This is a serious drawback. Books, journals and other literature are kept in different sections of the building as space permits. A new building to house a library together with furniture and staff facilities is an essential need.

(2) Atlas : A manuscript copy of an Agroclimatic Atlas has been prepared. The atlas would prove to be useful for educational institutions and other bodies interested in agriculture. I propose to have this published.

NATIONAL SCIENCE COUNCIL

In addition to the on-going programme of the National Science Council, it is hoped that during the Plan period (1977/81), the following two projects be completed.

(a) The establishment of a National Scientific and Technical Information Centre. Already Cabinet approval for this project has been obtained and a request for UNDP assistance has already been submitted to the U.N. Resident Representative.

(b) The establishment of a National Centre for Instrumentation and Repair and Maintenance of Instruments. Preliminary surveys for this project have been undertaken. It is hoped that plans for this Centre will be drawn up in collaboration with the Applied Physics and Electronics Division of the CISIR.

RESEARCH & DEVELOPMENT (Sectorwise) - Table I (in Rupees Thousand) *

SECTOR	1950/57	%	1965/66	%	Average annual rate of increase %	TOTAL 1950 - 1965	%
1. Plantation Agriculture	2,234	36.6	9,859	49.8	28%	107,859	42.8
2. Other	198	8.2	1,620	8.2	48%	18,506	7.4
3. Irrigation & Land Development	903	14.8	2,070	10.4	86%	38,227	15.2
4. Manufacturing	925	15.1	1,818	9.1	64%	24,134	9.6
5. Construction	80	1.3	282	1.4	16.8%	2,076	0.8
6. Transport & Communication	55	0.9	300	1.5	53.9%	1,565	0.6
7. Broadcasting & Meteorology	116	1.9	521	2.6	23.2%	4,376	1.7
8. Marketing,Commerce and Trade	21	0.1	304	1.5	89.8%	2,369	0.9
9. Town Planning,Electricity and Water	40	0.7	288	1.5	41.3%	6,188	2.5
10. Education	630	10.3	73	0.35	-	11,076	4.4
11. Services	598	9.8	2,677	13.8	23.2%	35,343	14.0

* Government Expenditure on Scientific Research and Development in Ceylon by Noreen Cooray

R & D Expenditure for 1974 & 1975 - Table II

	1974		1975	
	Rs.	US $	Rs.	US $
Intramural Expenditure				
Recurrent Expenditure	21,460,748	2,947,905	26,940,799	3,700,659
Capital Expenditure	6,185,875	849,708	9,281,976	1,274,997
Extramural Expenditure	997,437	137,010	462,660	63,552
Total Expenditure	28,644,060	3,934,624	36,685,435	5,039,208
R & D as a % of G.N.P.	.27	.27	.33	.33

US $ 1 = Rs. 7.28 % increase of funds from 1974 to 1975 approx. 22%

Intramural Expenditure 1974 - Table III

SECTOR	Recurrent Expenditure			Capital Expenditure			Remarks
	Personel Emoluments	Other	Total	Building & Fixed Assets	Equipment & Books	Total	
Non-profit making Institutes	1,068,414	373,905	1,442,319	1,381,388	252,439	1,633,827	
Private Industries	219,000	307,049	526,049	-	229,000	229,000	
Corporations	395,454	757,103	1,152,557	-	106,272	106,272	
Research Institutes	6,399,540	4,742,526	11,142,066	2,629,945	776,853	3,406,798	
Govt. Departments	4,692,488	1,320,419	6,012,907	438,029	371,949	809,978	
University	787,536	397,314	1,184,850	-	-	-	
TOTAL	13,562,432	7,898,316	21,460,748	4,449,362	1,736,513	6,185,875	

Intramural Expenditure 1975 - Table IV

SECTOR	Recurrent Expenditure			Capital Expenditure			Remarks
	Personal Emoluments	Other	Total	Building & Fixed Assets	Equipment & Books	Total	
Non-profit making Insts.	1,003,585	802,274	1,805,859	1,089,095	191,192	1,280,287	Marga,NERD NSC & NIM
Private Industries	240,000	592,803	832,803	-	230,000	230,000	Walkers & Sons, Lever Bros., Col. Comm. Co.
Corporations	728,871	791,889	1,520,760	653,944	170,811	824,755	Sugar,Paranthan, State Eng.Corp., Paper Corp., Ceramics Corp.
Research Institutes	9,182,594	4,997,505	14,180,099	3,887,152	2,566,478	6,453,630	CRI,MRI,TRI, RRI, ARTI,CISIR
Govt. Departments	5,677,226	1,770,781	7,448,007	221,192	272,112	493,304	Dept. of Agric., Dept. of Tele-communication
University	813,914	339,357	1,153,271	-	-	-	
TOTAL	17,646,190	9,284,609	26,940,799	5,851,383	3,430,593	9,281,976	