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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

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ASSESSMENT OF THE TRAINING CAPABILITIES OF SELECTED ORGANIZATIONS AND THE IDENTIFICATION OF AREAS OF TECHNICAL CO-OPERATION WITH UNIDO TO ENHANCE THESE CAPABILITIES

MALAYSIA AND SINGAPORE

RP/RAS/81/001

Terminal report*

Prepared for the Governments of Malaysia and Singapore
by the United Nations Industrial Development Organization

Based on the work of Robert Bell
UNIDO Consultant

United Nations Industrial Development Organization
Vienna

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SUMMARY OF FINDINGS AND RECOMMENDATIONS

1. The purpose of the mission was to visit various institutions selected by the Government and to assess their capabilities to make contributions, both nationally and regionally, to industrial training and management, in the interests of economic and social growth in developing countries. The mission was also intended to identify areas where technical co-operation with UNIDO would enhance the capabilities and make the process of growth more rapid.

2. The programme arranged for the mission was as follows:

(a) UNIDO headquarters, Vienna for briefing - 17-19 August 1981

(b) Malaysia, visiting nine separate institutions (annex I - page 110) between 24 August and 18 September inclusive

(c) Singapore, visiting seven separate institutions (annex I - page 112) between 21 September and 7 October inclusive

(d) Return to Kuala Lumpur, Malaysia to conclude the field part of the mission in the UNDP office on 9 October 1981 (note, 8 October was a national holiday for Hari Raya Haji)

(e) Return to UNIDO headquarters for de-briefing and group meetings from 12 October to 23 October inclusive.

In fulfilling the above itinerary the consultant enjoyed, and appreciated, the full support given to him by Government officials, the members of the institutions visited, the staff of UNIDO headquarters and the UNDP Regional Representative and his staff in Kuala Lumpur.

3. The criteria used in carrying out the assessments during this mission were based upon factors arrived at in protracted group discussions with other consultants and involved parties. The factors used as bases for the assessment and for which datum points were derived were as follows:

(a) Technical capacities

(b) Training capacities

(c) Personnel characteristics

(d) Programme parameters

(e) Supportive services

(f) Administrative function.

As far as can be ascertained, this uniformity of approach should remove possible anomalies and provide a basis for comparison between the findings of other consultants visiting different countries.

4. Of the nine institutions visited in Malaysia all were recognised to have the status of national institutions in that their contributions were unique in each of their various fields of endeavour. In general, the standards observed and the enthusiasm encountered were of a high order which augurs well for future developments in Malaysia. In six cases among the nine institutions visited plans were in various stages of advancement to expand and improve the facilities and these extension activities will undoubtedly enrich the capabilities observed at the time of the visit.

5. Given that the expansion programmes continue to be implemented, as outlined to the consultant, and that the areas of technical co-operation identified are accepted and acted upon then six of the nine institutions would have the capability to make a significant contribution to regional development and two of these six could also subscribe on an inter-regional basis. The six institutions with a potential capability to operate on a regional basis, subject in some cases to the completion of expansion programmes and additional technical assistance inputs are:

(a) University of Technology of Malaysia

(b) The National Institute of Public Administration

(c) Palm Oil Research Institute of Malaysia

(d) National Productivity Centre

(e) Rubber Research Institute of Malaysia

(f) Asia and Pacific Development Centre.

The findings and recommendations for technical co-operation inputs to enhance these findings are detailed on page 47.

6. Of the seven institutions visisted in Singapore all were again unique and specific in their fields of work and as such they already enjoy a national status. In all cases the staff members with whom discussions were held displayed a dedication and enthusiasm which was largely reflected in the standards achieved in the institutions. Singapore, in this decade, has a declared policy to thrust ahead into high technology and high value added processes in industry and each of the institutions visited were aware of

the need to meet this challenge. Three of the institutions have building extension and development plans being implemented over the next three years and this should result in a more effective contribution to the national policy.

7. Six of the seven institutions can be recognised as having the capability to make a significant contribution on a regional basis, subject to the fact that two of them are places of learning and it would be important that visiting students should be assured that the Diplomas awared would be recognised in their own country. Also, one institution is largely involved in vocational training which was outside the scope of the mission, but it would, nevertheless, provide a valuable resource for countries wishing to establish a system to regulate, standardize and certify craft skills. The six institutions identified as potential regional resources have, in some instances, development plans and changes in emphasis taking place. Subject to these qualifications the six institutions are:

(a) Ngee Ann Technical College

(b) Vocational and Industrial Training Board

(c) Singapore Polytechnic

(d) Singapore Institute of Standards and Industrial Research

(e) Singapore Institute of Management

(f) The National Productivity Board.

Several areas were identified where the changes being made to meet the new challenges of the future could be rapidly and effectively achieved with UNIDO inputs of technical co-operation and these are defined on page 52.

THE ACTIVITIES OF THE SELECTED ORGANIZATIONS VISITED IN MALAYSIA AND SINGAPORE

1. The New Delhi Declaration and Plan of Action reaffirmed that industrialization was considered to be fundamental to rapid economic and social growth in developing countries. In the achievement of this target, it was considered that long term plans for co-operation, which included provision for the exchange of experience and skills in industrial training and management, would be enhanced by identifying, and designating, existing national centres as "centres of excellence" for this purpose.

2. It was requested that developing countries and the UNIDO Secretariat should take joint action to achieve the above objectives and this mission forms a part of this overall strategy. The mission was concerned with Malaysia from 24 August to 18 September 1981, inclusive and Singapore between 21 September and 7 October 1981, inclusive and its objectives were as follows:

(a) Visit nine organizations nominated by the Government of Malaysia in order to assess their capabilities as industrial training institutions, and their potential as resources for the training of personnel from developing countries;

(b) Also, while in Singapore, to visit seven organizations selected by the Government of Singapore for the same purpose outlined in (a);

(c) To identify areas of activity where, if necessary, co-operation between UNIDO and the institutions could be directed towards improving the existing capabilities.

3. Background details of each of the institutions visited and the fields of activity in which they are engaged are set out below. A list of the persons with whom discussions were held during the visits is contained in annex I and a list of all documents made available for examination is given in annex II.

University of Technology Malaysia

4. The University of Technology Malaysia commenced its academic role as the first Technical School, in 1925, when it provided courses for the technical apprentices from the Public Works Department. In 1930 these courses were upgraded to provide training for the technical assistants of all Government Technical Departments and in 1946 the Technical School was given recognition as a Technical College. The present campus, in Kuala Lumpur was opened in March 1955, at which time the Technical College was the only educational centre offering academic courses in engineering at a high level leading to a diploma.

5. In 1960 courses were available leading to the professional examinations for membership of the Institutions of Civil, Mechanical and Electrical Engineers in the United Kingdom. Because of the encouraging candidate success rate a committee on Higher Education proposed, in 1967, that the Technical College be upgraded to a College of Technology. The implementation of this proposal was delayed and in 1971 a Planning Committee of the Ministry of Education made a recommendation which resulted in the College being accredited to status of a university in March 1972. On 1 April 1975, the name of the University of Technology (UTM) was officially adopted.

6. The University is empowered to award diplomas of technology and confer degrees, through its faculties, in the following disciplines:

(a) Mechanical Engineering

(b) Civil Engineering

(c) Electrical Engineering

(d) Surveying

(e) Sciences

(f) Built Environment

In each of the above faculties the diploma is awarded on successful completion of a three-year course and in the past these diplomas have been accepted as a means of entry into overseas universities at the final level. Students of good academic attainment are also encouraged to transfer from diploma courses to degree courses within UTM. In all cases the degree

courses are of five years duration except for a degree in architecture which is six years. The Departments contained within each faculty can be seen in annex III.

7. The University of Technology is financially supported by the Government and the Dean of each faculty prepares his budget requirements two years in advance (i.e. 1981 for 1983) although provision is made for amendments up to the month of June in the year preceding the budget allocation. The Bursar of the University compiles the budget of each faculty into a total University budget requirement before its submission to Treasury. In a similar manner the Registrar compiles a list of staff requirements for presentation to the Public Services Department.

8. The student population in UTM is currently circa 4,600 of whom some 2,000 are in residence within the campus or outlying halls of residence. In the allocation of residence, priority is given to first and final year students. Of the 4,600 students approximately 66 per cent are studying for diplomas of technology while the remainder are reading for degrees. Some of the students contained within the larger group will, through the selection processes used, eventually step up to the degree stream. The total number of academic staff in UTM is 473 and of these some 88 may be on sabbatical or studying for higher qualifications at any time. The organizational chart for the University showing the division of staff and students within the faculties is shown in annex III.

9. The subject matter taught in each faculty is determined by Curriculum Development Advisory Committees comprising members of the faculty, individuals of academic and professional standing and representatives of private enterprise and Government Technical Departments. This process ensures that the contents of the relevant courses conform to the nation's current and future needs. Similarly an Examinations Board ensures that the examinations at the various levels are compatible with the subject matter in the syllabi and that the standards of attainment are maintained. The language used throughout the University is Bahasa Malaysia, but the capability exists to communicate equally well in English.

10. Related practical training is arranged for all undergraduates during vacation time, with periods of six weeks after the first and second years and eleven weeks after the third and fourth years. The two earlier training

periods take place in the University, while the two eleven-week periods are job oriented through industrial attachments. All of the survey data produced by the consultants for the new campus in Johore Bahru has been confirmed by the students of the Faculty of Surveying, in a meaningful application of the training activity.

11. The site of the existing University at Jalan Gurney, Kuala Lumpur is fully developed and all resources are used to full capacity. However, a new site of almost 3,000 acres is available in Johore Bahru, the southern state, and plans have been prepared for the development of this site to provide a new university campus for 1983. The existing University at Jalan Gurney will still be retained and utilized although the exact utilization of the total resources has yet to be finalized. The allocation of buildings on the plans for the new campus indicate that all faculties will be represented there and should benefit from the vastly improved facilities planned.

12. The University of Technology of Malaysia provides the main source of supply of people qualified in technological subjects and as such it enjoys national status and recognition. The Deans and Heads of Departments are enthusiastic, highly motivated and alert to the need to progress and develop to meet the changing technological demands of industry. The development of the new campus in Johore Bahru will permit an increase in the student population and requires a concomitant increase in academic staff. A major source of supply of the academic staff is from among those graduating in the University which presents an undesirable feature of in-breeding that is largely unavoidable. The staff do, however, have sabbatical opportunities and exposure to local industry which in time brings a balanced approach.

13. Subject to the satisfactory development of the resources in Johore Bahru in 1983 and with the improvements that would arise from technical co-operation with UNIDO, the University could have the capability to become a regional centre for technologically based diploma and degree courses. Suggested areas of co-operation with UNIDO are given on page 47.

The National Institute of Public Administration (INTAN)

14. The National Institute of Public Administration (INTAN) came into being as the Government Training Agency in 1927 and became known by its present title in 1972. As the official training agency for all public service personnel, INTAN is given the status of a Division within the Public Service Department and is responsible to the Director-General of that Department. A functional relationship has been established between INTAN and the Training and Careers Development Division of the Public Service Department thus providing the means of meeting the needs of both personnel development and planned growth in the Government sector.

15. The Institute is headed by a Director with two Deputy Directors, one being responsible for management while the other is responsible for academic affairs. The Institute is divided into five departments, each with a distinct range of training activity and a Bureau of Research and Planning. There is, in addition, a Training Development Unit and a Unit for the Co-ordination of State Training Centres. There are eleven States in Peninsular Malaysia and, with the exceptions of the States of Perlis and Malacca, each has an INTAN training centre. A simplified organizational chart is attached (annex IV). The membership and functions of the Advisory Council shown on the organizational chart are listed in annex V.

16. The five departments directly concerned with training offer a variety of courses ranging from one day to one year duration. Some courses are of fixed duration and content but a modular training concept is applied to many courses to give maximum flexibility and economy of effort in meeting the needs of the trainees. As a division of a Government department, INTAN is funded from the Treasury and training courses are provided free to Government staff and officials from statutory bodies. Persons from the private sector in Malaysia and foreign students may be admitted to the courses and in these cases the Director has the discretion on the charging of fees. The course headings are listed under their respective departments in annex VI.

17. Foreign trainees from Korea, Indonesia, Nepal, Philippines, Thailand, Bangladesh, Sri Lanka, Fiji, Bhutan and Papua New Guinea are currently united and receiving training at the INTAN centre at Petaling Jaya, near Kuala Lumpur. The following courses are available for trainees from the Asia/Pacific region:

(a)	Agro-based industrial development	12 weeks
(b)	Project planning	12 weeks
(c)	Personnel management in the public sector	2 weeks
(d)	Financial planning and management	12 weeks
(e)	Supply and materials management	3 weeks
(f)	Urban planning and management	12 weeks
(g)	Regional planning and management	12 weeks
(h)	Training of trainers	6 weeks

18. Residential accommodation is available for 300 trainees, either on the campus or at outlying apartments. Adequate recreational facilities, restaurants and lecture rooms are available in the Petaling Jaya centre. There is also a library with a full-time librarian and although the library does not maintain a large holding of books and journals it is well supported from an external source and can obtain books as requested.

19. The Bureau of Research and Planning, also shown in annexes IV and V, concentrates its work in fields directly relevant to the activities of the other departments. In particular, it determines the training needs for the Government service and carries out programme and course evaluations. The Bureau is also responsible for the preparation of publications and special projects such as the co-ordination and implementation of the expansion programme specified in the 4th Malaysia Plan and outlined below.

20. Further expansion of the facilities and activities of INTAN are planned and a site of 135 acres is being developed in a district of Kuala Lumpur where other Government offices already exist. When this new national centre is opened, the existing centre in Petaling Jaya will become the regional centre for the State of Selangor, in which Petaling Jaya is situated, and the adjacent State of Megri Sembilan. Other regional centres will be developed in the State of Kedah, for the northwest, the State of Trengannu for the east coast and the State of Johor in the south. East Malaysia, which consists of the States of Sabah and Sarawak on the northern coast of Borneo will also be serviced by either one or two regional centres.

21. In the past INTAN has received aid from the Government of the Netherlands, in the form of financial support and expertise, for the development of the agro-based industries courses. Although the technical experts have now been withdrawn some financial support remains. A lecturer from the University of Aston, Great Britain, is currently in the last stages of a six-months attachment to INTAN to assist in the production management courses. The services of this person were obtained through a recruiting advertisement in the press in Great Britain and the cost of his attachment is borne by INTAN.

22. The Institute is very effectively operating as a national centre in meeting the training needs and staff development programmes for government employees. It is reasonably well equipped and has ample resources to enable it to extend the training programmes to other nationals on a small scale, which it is currently doing. The staff level, at 92, is below the accepted level of 125 and this figure should increase further when the new centre is developed. The new staff will require training to become effective and this coupled with other areas where inputs could be made to enhance the present capability are given on page 48.

Palm Oil Research Institute of Malaysia (PORIM)

23. There has been a rapid expansion of the palm oil industry in Malaysia over the past two decades, to the point where Malaysia is now the world's largest producer and exporter. In 1978, the total area planted to oil palm was 800,000 hectares, of which 200,000 hectares were immature plants, and at the high rate of expansion the area planted to oil palm [1/] became 1.04 million hectares by 1980. The industry now employs a total of about 250,000 people on smallholdings, estates, mills, refineries and dealers and the production forecast for 1983 is 3.6 million tonnes of palm oil. [1/]

24. In view of the past rapid growth and the future expansion plans in the palm oil industry the Government passed an Act of Parliament, the Palm Oil Research and Development Act, 1979, on 15 May 1979, to create the Palm Oil Research Institute of Malaysia (PORIM). Prior to the establishment of PORIM

1/ It should be noted that the term oil palm is used to refer to the plant while the term palm oil is used to refer to the derivatives of the fruit of the plant.

research had been carried out by the Oil Palm Branch of the Malaysian Agricultural and Research Development Institute (MARDI). Before the inception of MARDI in 1971 crop research had been carried out by the Department of Agriculture and the large plantation agencies. The Institute, under the direction of the Palm Oil Research and Development Board is responsible for conducting and promoting research on all aspects of the industry from biological research to improve yields and agronomic practices, through to improvements in end user applications and quality.

25. The PORIM headquarters currently occupies one complete floor of a large modern office complex in Kuala Lumpur and additional offices for the Techno-Economic and Information Division are provided in a nearby office block. The research laboratories are temporarily situated in adapted buildings in Ampang Jaya, on the outskirts of Kuala Lumpur, and they are well provided with modern equipment and adequately staffed to carry out the research programme. Biological research is undertaken, on land leased from MARDI, in experimental stations at Kluang, Jerangau and Serdang in the State of Selangor. Arrangements have been made to undertake joint research projects with the University of Science (University Sains) Penang and the National Chemical Laboratory for Industry, Japan. It is intended to further expand this collaborative research to include local and foreign universities and other organizations.

26. PORIM provides a technical advisory service to consumers and is responsible for the collation and dissemination of information relating to palm oil and oil palm products. The objective of these efforts is to promote market development, find new uses and increase the techno-economic strength of palm oil in the world oils and fats industry. The Palm Oil Research and Development Board has recently acknowledged the expansion of this activity by agreeing to the technical services operation in the United Kingdom in headquarters shared with the Malaysian Rubber Planters Association.

27. Since its establishment in May 1979 PORIM has developed its organizational structure (annex VII) and secured its financial base. Funds were provided voluntarily by the industry in the first year, but the Palm Oil Research and Development Act, 1979, provided for a research cess on palm oil and these funds became available in 1980 (M$10.6 million). The research

cess currently stands at M$4/tonne of palm oil and the growth of palm oil production which is forecast at 3 million tonnes in 1982 assures the Institute of the funds to continue its activities. The functions and activities of PORIM are listed in annex VIII.

28. While the present accommodation used by PORIM is only regarded as temporary, provision has been made for the development of a new headquarters and research facility on a 25 acre site about 15 miles to the south of Kuala Lumpur on the Seremban highway, which provides good fast communication to Kuala Lumpur. The new buildings, funded by Government at a cost of M$16 million, will provide accommodation for all staff, numbering about 142 at present, and new laboratories to house the research equipment for the purpose of analysis and determination of the physical and chemical characteristics of palm oil. A list of some of this specialized equipment is attached (annex IX). The transfer to the new site is planned for September 1983.

29. One problem facing the palm oil industry in Malaysia, and other oil palm growing countries, is that of having a standardized procedure for routine sampling and oil analysis in the determination of oil yield for individual palms or progencies. This data is of paramount importance in assisting in the selection and breeding programme leading to higher and better quality yields and at present results cannot be compared as the agencies bases of sampling and analysis differ. Due to these variations in sampling and extraction for analysis, PORIM has been requested, by the industry, to evaluate and evolve a standardized procedure which can be adopted throughout the country and perhaps utilized in other oil palm growing countries.

30. The Palm Oil Research Institute of Malaysia is unique and deeply involved in developing what is already a considerable trading income asset in Malaysia. The dissemination of information on the properties and uses of palm oil are considered fundamental to the future well being of the industry and in this respect PORIM would provide excellent facilities for training overseas personnel concerned with uses and applications of the end products in the foods industry. Considerable resources also exist for training in specialist areas such as breeding, cultivation, cropping, milling and refinement all of which are supported by personnel

of high academic and technological attainment. When the resources of the new headquarters are available, about September 1983, PORIM will have a high capability as a training and research resource. To enhance the training component an input from UNIDO could be made and this is detailed on page 49.

Malaysian Institute of Management (MIM)

31. The Malaysian Institute of Management (MIM) has a corporate entity as a Company Limited by Guarantee and was inaugurated as a voluntary society on 29 January 1966. The Institute was established through the efforts of the private sector with the support and encouragement of the public sector. The formation of the MIM followed upon the suggestions of the Minister of Commerce and Industry, in 1964, that the need existed for a national body to further the progress and development of professional management in Malaysia.

32. Since its formation in 1966, with a total membership of under 250, the MIM has grown to a total membership of 1,672 in 1980. This total membership consists of 1,268 individual members of various grades and 404 group or corporate members. The individual membership at 31 December 1980, as declared at the Annual General Meeting held on 30 April 1981, was made up as follows:

		increase on previous year
Fellows	22	nil
Ordinary members	235	4
Associate members	731	91
Affiliate members	280	34

In the same period group membership increased by 50.

33. The Institute had fixed assets consisting of freehold land, buildings, motor vehicles, office furnishings and equipment totalling M$1,305,711 at the year ending 31 December 1980, which after allowance for depreciation shows a net book value of M$1,231,247. Some assets were, however, lost in a fire on 19 February 1981, which totally destroyed the rented accommodation and its contents. This was, unfortunately, the second occasion that MIM had suffered losses through fire as the rented accommodation in the Jalan Campbell complex, Kuala Lumpur, was also totally destroyed about the

middle of 1976. On both occasions the Institute made a rapid recovery and continued with its programmes. The Institute is presently located in a large residential type building standing in over one acre of land in Jalan Ampang, one of the main residential areas on the outskirts of Kuala Lumpur. The purchase of the freehold of this property has given MIM a secure appreciating base on which to develop in the future.

34. Plans have been made to build new accommodation on the site in Jalan Ampang and this will provide larger improved facilities for offices, lecture rooms and restaurant. The building programme is expected to be completed during 1984, until which time the training courses will continue to be offered in appropriate hired accommodation. The funds for the operations of MIM are derived from membership fees and the charges applied to the training courses available. The fees for membership are in two parts, an entrance fee and thereafter an annual subscription depending on the type of membership, as follows:

	M$
Fellows (FMIM)	150
Ordinary (MMIM)	75
Associate (AMIM)	50
Affiliate	25

Group membership annual fees are based on a scale from M$150 for groups up to 50 persons, to M$1,500 for groups of 300 and over. Membership brings the benefit of a reduction of about 20 per cent in the scale of charges for the training courses, as well as the regular transfer of management information through the medium of the MIM bi-monthly newsletters.

35. The organization structure (annex X) is well defined and typical for its purpose. The general manager who heads the MIM Secretariat and directs the overall administration is an expatriate from the United Kingdom and he is fully supported by appropriate management and specialist sub-committees as well as a structure of local senior staff as heads of departments. The full time training staff consists of three experienced people and two new members being trained as training officers. Although the full time staff is small for the vast range of training programmes mounted they act mainly

in the capacity of organizers, as selected experienced managers are drawn from the industrial sector or academic sources and paid a fixed honorarium to act as lecturers. This has the advantage that operating costs for the Secretariat can be minimized while sound industrial experience is brought to bear on the courses.

36. Plans exist to increase the permanent teaching staff in the future, in accordance with the view of the past Chairman of the General Council that MIM is now assuming a leadership role of the management movement in the Far East and Australasia region and may even play an active role internationally. Significant in this respect is the recognition given to the certificates and diplomas of management awarded by the Institute. These feature prominently among the wide range of courses offered in various locations such as Kuala Lumpur, Penang, Ipoh, Kuching in the State of Sarawak on the north coast of Borneo and Kota Kinabalu in the State of Sabah also on the north coast of Borneo. In general, courses are mounted in locations appropriate to the demand and the list of these courses is given in annex XI. A number of trainees from Indonesia, Thailand and the Philippines have attended the courses but this is not a regular feature of the programme.

37. MIM meets an essential need for management development programmes, primarily for the private sector, although the courses are also available to people in the public sector. In this respect, MIM is providing a valuable national service but the present resources are considered inadequate with regard to making a regular contribution for overseas trainees. This situation may change when the planned building programme is completed and the present training staff strength is increased. The capability as a national centre could be enhanced with small inputs of assistance from UNIDO and these are outlined on page 49.

National Productivity Centre (NPC)

38. The National Productivity Centre was established in 1962 as a joint UNDP/ILO and Government project. The Plan of Operations for the project envisaged that the NPC would become an autonomous body and this was realized with the enactment of the National Productivity Council (Incorporation) Act No. 19 of 1966 and the resultant autonomy commenced on 1 March 1966.

Since that time one further act has been passed, the National Productivity Council (Incorporation) (Amendment) Act 1975 (Act A305 of 1975), amending the original act in keeping with the expanding activities of the Centre.

39. The Act defined the composition of the Council and provided that the Chairman and members would be appointed by the Minister of Trade and Industry. The Director, as the Chief Executive of the Centre, is appointed by the Council and with the approval of the Minister also takes a seat on the Council. The members of the Council are representatives of Government, management, trade unions, employees and the commerce, manufacturing and financial sectors. The Council is empowered to appoint the members of committees such as the Finance Committee, Establishment Committee and the Programme and Planning Committee. An organizational chart is attached (annex XII).

40. The headquarters of NPC is situated in Petaling Jaya, a suburb of Kuala Lumpur, and consists of a large office block providing office accommodation, library and several lecture rooms. On land adjacent to the office block an hotel is being constructed by NPC and this will meet the joint needs of residential accommodation, modern conference and lecture rooms and restaurant facilities, while providing a good training situation for the hotel and catering training activity of NPC. It is expected that the hotel will be available for utilization by April 1982. Meanwhile a further two acres of adjacent land has been procured and additional office accommodation along with lecture rooms will be built and become available in 1983. The sum total of these developments will ensure NPC is self-sufficient and able to meet the expansion of activities in the future.

41. The operating funds for NPC are at present provided largely by Government with about 80 per cent of the requirements coming from this source and the balance being obtained from consultancy services to private enterprise or course fees. The Government will continue to subsidize the operational costs of NPC until such time as it becomes self-supporting. The total budget is currently about M$10,000,000 with approximately half being used for the development programme and the remainder meeting the operating costs. The staff strength of NPC, including the regional offices, is in the order of 240 of which about 80 are administrative or provide supporting services to the academic team.

42. The objectives of NPC are:

(a) To raise the standard of management and supervision at all levels;

(b) To improve the efficiency of industrial operations, sales and marketing, with particular reference to increasing productivity, improving quality, lowering costs and giving training and advice on labour-management relations;

(c) To initiate training and other programmes designed to serve the specific requirements of the country;

(d) To accept and perform consultancy services and carry on business undertakings for profit;

(e) To publicize the aims, objectives and activities of the Centre, obtain the co-operation of employer and employee groups and serve as a forum for discussing organizational, managerial and supervisory problems;

(f) To establish and maintain contact with similar or complementary agencies both national and international.

43. The objectives of NPC are designed to be met through a wide variety of training courses, either in a standard form of programme, or built up on a modular training technique to meet the particular requirements of commerce and industry. During 1980 436 training courses were mounted and 9,337 persons attended. The Centre has been carrying out a programme of decentralization with the result that there has been an increase in the training activities in the regional centres over the past years. While actively implementing its programmes, NPC has still been the recipient of technical aid assistance from the Government of Japan, India, Austria, the United Kingdom and the Federal Republic of Germany. Fellowships have also been provided for the Centre staff through the agencies of ILO and UNIDO under UNDP. These inputs are now completed with the exception of one person from the United Kingdom who is contributing to the industrial engineering programme and is due to leave shortly. A list of training courses is attached (annex XIII).

44. In addition to the provision of training courses the Centre also arranges film shows and seminars. There has been an increase, over the last five years, of the small business advisory and consultancy service. This service has a follow-up system which is now regarded as a vital activity in the entrepreneurial development programme. Participants in the Entrepreneur Development Programme were visited within six months of attending the course so that business development constraints could be identified and given remedial action. Although no students from outside Malaysia have attended courses at NPC several of the staff have contributed to international seminars and workshops held in Kuala Lumpur.

45. NPC is a fairly dynamic organization stimulated by the enthusiasm of the Deputy-Director (Training) who has a development plan for his staff. The average age of the training staff is about 30 years and because of this the Deputy Director is anxious to improve their capabilities. The Centre operates effectively on a national level and could make a regional contribution when the expansion building programme is completed, providing the staff development and training programme is fully implemented. In this respect, there is a useful contribution that could be made through a technical co-operation programme with UNIDO and these possible inputs which were the subject of discussion with the Deputy-Director are listed on page 50.

Rubber Research Institute of Malaysia (RRIM)

46. The RRIM was established in 1925 with a total senior staff strength of about 20 expatriates. There has been considerable growth and development since that time and in 1972 several natural rubber bills were passed through Parliament to co-ordinate and consolidate the activities of the various natural rubber bodies in the country. The RRIM is now responsible to a Statute Board, the Malaysian Rubber Research and Development Board (MRRDB) whose main functions are:

(a) Plan and determine policies and programmes for natural rubber research, technical development and promotional work with regard to industrial and commercial circumstances applying nationally and worldwide;

(b) Collect, collate and interpret all information pertaining to the rubber industry;

(c) Co-ordinate activities within and outside Malaysia relating to research, development, publicity and other matters affecting the natural rubber industry;

(d) Control the activities and policies of all dependent research and development organizations of the MRRDB (annex XIV).

47. The research and development activities of RRIM are supported by a research cess which is currently M$0.035/kilogram of all exported rubber and this fund which is known as the Malaysian Rubber and Research Development Fund is managed by the MRRDB. The RRIM budgets from the fund to enable it to pursue its defined activities which are:

(a) Natural rubber research for the whole of Malaysia inclusive of Sabah and Sarawak on the north coast of Borneo;

(b) End use research and development of new rubbers to complement its erstwhile main focus on production research;

(c) Adaptive research on strategic and selected smallholder problems, but leaving implementation to another government agency.

The RRIM now employs 220 Malaysian senior research staff engaged on research and development in several separate divisions and two experimental stations (annex XV) and has an annual budget of M$30 million in 1981. The research staff are supported by an administrative and service strength of 1,350 people. Some of the fields of activity of the divisions shown in annex XV are detailed in annex XVI and these give an appreciation of the wide range of experiments and research which are conducted on a continuous basis.

48. The headquarters of RRIM is situated in a large office complex in several acres of ground in Jalan Ampang, a main road on the outskirts of Kuala Lumpur. The staff of the Training, Personnel and Staff Development Division are accommodated in these buildings with facilities for arranging and conducting training courses. The experiment station at Sungai Buloh (25 km from Kuala Lumpa) includes over 1,250 hectares under rubber which is devoted to experiments on breeding and selection, small scale trials of hand pollinated seedling families and large scale trials of selected clones. In addition the station has a factory for the production of many types of raw rubber and for the study of processing problems and techniques. This factory can also produce 10 tonnes of tyre rubber a day for experimental work on tyre production and properties. The experiment station at KOTA TINGGI, JOHORE, has a slightly smaller area which is again planted in rubber for experimental purposes. Both experiment stations are also utilized as a training resources for smallholders and estate personnel, in addition to the research activity which is carried out. The Sungai Buloh station has residential facilities for 50 course participants and the Natural Rubber Processing School situated there provides diploma courses in natural rubber processing, while the Natural Rubber Training School also in the station can accommodate 30 residential trainees on the natural rubber, production, management and processing course.

49. The RRIM provides a number of training courses either at the experiment stations, in theheadquarters or at other locations, and facilities exist for overseas students to join these courses. Diplomas are awarded for the successful completion of the natural rubber processing course and over 200 students have been trained since the inception of the course in 1965, including several from overseas, Cameroons, Sri Lanka, Philippines, Thailand and Indonesia. Certificates are awarded on the satisfactory completion of a range of other training courses offered by RRIM (annex XVII).

50. Although the research facilities existing at the experiment station at Sungai Buloh are readily deployed in the interests of training this has the disadvantage that it can interrupt the continuity of research. Small scale pilot plants for training purposes would be beneficial and in particular US$80,000 expenditure would provide a plant for the implementation of a 3 weeks course on ribbed smoked rubber. Similarly, small scale trials

show that the pyrolysis of rubber wood at 300°C approximately produces useful products such as charcoal, wood spirit, crude pyroligneous acid, acetic acid and tar, with the liquid fractions being separated by fractional distillation. These products have application within the rubber industry and further investigation of the viability of the project should be pursued. Several technology courses for supervisors and technicians could be mounted or improved if low cost pilot plant was available.

51. The RRIM is an intrinsic part of the rubber industry, which is a major contributor to the Malaysia trade balance and as such it provides an invaluable service on a national scale. The head of the Training Section and the Group Training Officer displayed an enthusiasm and dynamism which reflected in the capabilities of other staff members. The training function is quite strong and has the capability to provide training on a regional basis. The service of the Training Unit, however, could be further improved by capitalizing on the ideas that were discussed and providing pilot plant for training purposes. Details of this and other possible inputs are recorded on page 50.

Standard and Industrial Research Institute of Malaysia (SIRIM)

52. The SIRIM was established by an Act of Parliament, Gazetted as the Standards and Industrial Research Institute of Malaysia (Incorporation) Act 157 1975 on 22 May 1975. This act terminated the separate activities of the Standards Institution of Malaysia (SIM) and the National Institute for Scientific and Industrial Research (NISIR) and merged the two organizations to give a better utilization of manpower and resources and obviate possible duplication of effort. The offices, workshops and laboratories of SIRIM are now situated on a site at Shah Alam, Selangor, about 25 km from Kuala Lumpur and further construction work is now in progress to expand the facilities.

53. The financial budget of SIRIM for 1982 is expected to be between M$14/15 million of which some 90 per cent will be provided by Government and the balance will be derived from various sources such as fees for services, sale of publications, royalties and donations. All monies are paid into a fund, which was established in the Act of Parliament, and

they are then administered and controlled by the Council, which is a corporate body. The Council, which consists of 24 members, has the power to appoint committees to assist it to carry out its functions and at present three such committees are in existence. Council members are appointed by the Minister of Science, Technology and Environment, with the exception of the Deputy Chairman who becomes a Council member by virtue of his appointment as Controller of the Institute. An organization chart for SIRIM is attached (annex XVIII).

54. The total staff strength of SIRIM is in the order of 675 persons with the technical staff being divided over 5 units. Under the management and direction of the Council, the Institute has the following functions:

(a) to promote, develop and promulgate standards for commerce and industry and for goods produced in or imported into Malaysia.

(b) to provide for testing of commodities, processes and practices, to encourage the establishment of quality control facilities in industry and provide related consultancy services.

(c) provide registration of certification marking for quality control and regulate its use.

(d) promote industrial efficiency and development

(e) promote industrial health, safety and welfare

(f) promote and undertake industrial research to:

(i) improve technical processes and methods

(ii) discover new processes and methods

(iii) encourage the utilization of Malaysian products

(iv) adopt or adapt technologies developed in other countries for use in Malaysia

(g) provide industrial extension in meeting standards

(h) generally to improve production processes and techniques.

55. The workshops and laboratories of the Institute are modern and recently occupied, in some cases, with equipment temporarily located. The range of equipment is good and essential to the variety of work carried out, with the physical conditions of temperature, humidity and dust being controlled, or

in the process of being controlled, to ensure a standard environment where necessary. When the present extension programmes are completed and the laboratories are more permanently established with a greater degree of control over the activities, the Institute will be able to offer a very wide range of scientific testing facilities with a commensurate consultancy extension service to industry and commerce. At the present time SIRIM is the recipient of a fellowship programme, at a cost of US$265,000, which is being administered by UNIDO. Maximum benefit is being derived from this technical co-operation programme which is exposing the technical staff selected to developments and practices in their fields of work.

56. The Metal Industry Technology Centre (MITEC) has been constructed and equipped under a Japanese technical co-operation programme and was officially opened on 3 September 1981, by the Prime Minister. The Centre is divided into 4 main areas, namely die making and press workshop, welding workshop, electro-plating workshop and testing and inspection laboratory. These departments are supported by drawing offices, machine shop, x-ray and dark rooms, lecture rooms and administrative services. As the Centre has so recently opened the Japanese technical staff are still assisting their counterparts and carrying through a development programme with a view to self reliance in 1982. At that time the activities in MITEC will have expanded to include the training of industrial personnel in the newer metal working technologies.

57. SIRIM is the sole national body for industrial standards and research for industry as a whole and is well equipped to carry out its responsibilities. The temporary situation which is present while the building programme continues is not conducive to the work being carried out and every effort should be made to alleviate this position as quickly as possible and locate the valuable equipment in permanent places and in a correct environment. The fellowship programme should bring considerable benefit to the staff and improve their abilities in the various fields so that when the Institution building programme is completed and the organization is securely based SIRIM should be able to make significant contributions to the industrial economy.

58. The post of Training Officer remains open at this time and some urgency should now be attached to the establishment of this function. There will be a considerable amount of work, such as the determining the parameters of the training programme and the needs it has to fulfill as well as the

development of course materials, training aids and literature generally. With a soundly based and integrated training department the full value of the work being done by SIRIM can be more quickly transferred to the industrial sector with attendant economic benefits. This important role for the training officer will be more quickly realized if the appointment coincides with an input of technical co-operation from UNIDO as outlined in page 51.

Asia and Pacific Development Centre (APDC)

59. The APDC evolved from the re-organization and integration of 4 regional units, namely, the Asian and Pacific Development Institute, the Asian and Pacific Development Administration Centre, the Social Welfare and Development Centre for Asia and the Pacific and the Asian and Pacific Centre for Women and Development. The restructuring process began in November 1978 when a joint ESCAP/UNDP group convened and culminated with ESCAP formally announcing the creation of the APDC in March 1980. The Centre came into being in Kuala Lumpur on 1 July 1980 and commenced the implementation of its training programmes in November 1980 (annex XIX).

60. The Centre, which had its official inauguration on 17 August 1981, is located in a modern 15 storey office block on a site of about 7 1/2 acres at Pesiasan Duta, 4 miles from the centre of Kula Lumpur. The building is entirely at the disposal of the APDC and includes a large library, an auditorium with seating capacity of 300, six small seminar rooms each for 25 people, and a conference room to seat 35 people. The building also provides hostel accommodation of 40 rooms and a restaurant facility to seat 300 persons. The building was constructed at a cost of M$6.05 million to the Malaysian Government and was completed in May 1980 shortly after the announcement of the formation of APDC. The APDC represents the development interests of 38 member countries stretching from Iran in the West to Cook Islands in the East and bounded by Mongolia, Korea and Japan in the North to Australia, Republic of Kiribati and New Zealand in the South (annex XX). The management board members are multi-national and listed in annex XX.

61. The Centre is funded by a member country's contribution of US$700.000 and the administrative, clerical and services supporting staff are allocated and paid by the Malaysian Government. The Director, Mr. Aftab Ahmad Khan is from Pakistan and is a full time member of the Centre in Kuala Lumpur. A technical team of specialists and consultants is recruited on a contractual basis and rewarded on the United Nations salary structure at about P5 or D1 grade. The Centre has 4 objectives which are:

(a) PROMOTIONAL: Study development problems, find solutions and implement them.

(b) CO-ORDINATING: Bring together institutions and individuals concerned with improving development planning and management.

(c) SYNTHESIZING: Integrating the variety of regional research outputs on alternative development strategies and training programmes related to them.

(d) DISSEMINATING: Facilitate the exchange of experiences in regard to development problems and training methods.

62. The specialists and consultants previously mentioned will operate in four programme areas and each area will be headed by a project co-ordinator. Each co-ordinator will lead a team of technical specialists varying between 2 and 4 persons depending on the activity. At present only one project co-ordinator is in post, that of the mobilization of Human resources development programme area. It is intended that the Centre will mount research and training activities in each of the 4 areas and recruitment of the 3 remaining project co-ordinators and the technical staff for each are planned to be in post and commence activities by 1 January 1982. The 4 areas of activity are as follows:

1. MOBILIZATION OF HUMAN RESOURCES FOR DEVELOPMENT
2. ENERGY PLANNING AND MANAGEMENT
3. FOOD SECURITY
4. THE INTEGRATION OF WOMEN IN DEVELOPMENT

The 4 areas will be the subject of multi-disciplinary and inter-disciplinary research andtraining programmes and it would appear that the programmes already mounted (annex XX) fall mainly in the category of a CO-ORDINATING (para. 61(b)) role.

63. It is planned that the present UNDP input will be phased out about December 1983 at which time the Centre will be operated under the aegis of the Management Board and will be staffed on an inter-governmental basis. The present organization chart of the Centre is given in annex XXI but this may change as the role of the APDC develops and it becomes a self-reliant multi-national organization. The Centre must be regarded as a regional resource in its present role and no further inputs of technical co-operation are envisaged over and above the present programme.

MARA Skills Centre

64. The population of Malaysia can be divided into three distinct groups, namely, the Malays, the Chinese, Indian and Minor groups of other nationalities. The Malays were traditionally rural and less business oriented than the other groups so the Government created MARA to further the interests of the Malays (the bumiputras) by providing them with equal opportunity of involvement in industry and commerce.

65. The skills training activity of MARA is currently undertaken in 9 training centres but the expansion plans for the next five years will bring about an increase to 20 centres. The objective of these centres is to train bumiputras to meet the skills needs of Malaysia and where appropriate to further develop the capability of selected trainees to become entrepreneurs. Both male and female trainees are admitted to the training programmes and the age range of the trainees falls between 17 and 25 years. A Lower Certificate of Education (LCE) is requisite for entry to most of the courses with some courses such as electronics and draughting requiring a higher qualification.

66. The training programmes are spread over 4 approximately 6 months semesters with job experience being provided between the 3rd and 4th semester. On completion of the skills training about 90 per cent of the trainees leave to enter into employment while the balance continue their training either at a more advanced stage or as trainees in the Entrepreneur Development Division of MARA.

67. The aim of the Entrepreneur Development Division is to train and assist into operation about 1,200 entrepreneurs a year. Entry into the scheme can be direct, or through the skills training branch where, for example, a trainee qualifying as a skilled motor mechanic can be given the entrepreneur skills and assistance to commence business in vehicle repair. Those in the skills training programme displaying the temperament and aptitudes for business are offered the opportunity of the further training in the Entrepreneur Division.

68. The Entrepreneur Development Division consists of 3 sections which are the Technical Advisory Section, the Market and Contracts Section and the Entrepreneur Development Section with responsibility for the training activity. The training programme is on a modular basis making it a flexible means of providing full training for those wishing to become entrepreneurs or part training for existing entrepreneurs wishing to improve their capabilities (annex XXII). The general age limits for entry into the entrepreneur scheme fall between 21 and 40 years. The Technical Advisory Section provides a free service at any stage of an entrepreneurs venture and this can range from land and property problems to raw materials and market information, or production techniques as appropriate to the business venture.

69. MARA provides funds to new entrepreneurs to enable them to launch a business ventre and this is done through a loan with an upper limit of M$50,000 and a maximum repayment term of 15 years. Existing entrepreneurs also have the opportunity to apply for a loan to improve, expand or diversify their business interests but the loan when granted is subject to a 5 year term for repayment. There are no restrictions on the type of business activity the entrepreneur may choose and providing it is considered a viable prospect by the Technical Advisory Section it is entitled to support. Loans for new entrepreneurs come from a Government grant system at a current interest rate of 7 per cent for amounts below M$5,000 while loans to existing entrepreneurs are issued from a fund on loan to MARA by Government at a current interest rate to MARA of 3 per cent.

70. The MARA training programmes are acknowledged to be of a good standard and in the skills training activities the trainees meet the standard test procedures of the National Industrial Training and Trade Certification Board at all grades. The entrepreneur programme is also effective and extensive in its support of some 30,000 entrepreneurs with

loans totalling M$100 millions. MARA is recognized as a national institution for the training and development of the Malay ethnic group. Its use as a regional resource is not envisaged because its activities are particular to Malaysia. Discussions with the Directors of the Entrepreneur Division indicate that a contribution could be made by an attachment of an expert in Entrepreneur Development with emphasis on the motivation and behavioural sciences aspects. Such an input would undoubtedly enhance the work being done in this field.

Singapore

Ngee Ann Technical College

71. Ngee Ann Technical College was established in 1963 having been formerly known as the Ngee Ann College. In 1967 the College accepted and implemented the recommendation that it should become a tertially education and training institution for commerce and industry. The College now fills the role of supplying qualified people to meet the demands of the technician and junior management levels in the rapidly expanding Singaporean industrial economy. Since its inception as a Technical College, there has been a rapid increase in the student population from 116 enrolling in the technician diploma course in mechanical engineering in August 1968, to a student strength of about 3,400, of these about 14 per cent are female, distributed over five departments awarding technician diplomas.

72. In 1972 the College established an academic link with the Polytechnic of Central London and through this, supported by British Government Aid, received technical expertise and advice as well as the services of external examiners. This association carried the benefit that, from 1974, the diplomas were jointly certified by the two institutions and thus gaining for the NATC graduates a more ready and rapid acceptance of their diplomas by the public. The joint certification was discontinued after the August 1979, examinations as the objective of gaining recognition had been achieved. The association between the two institutions is still maintained, however, but is is now on an informal basis as a means of interchange of ideas and developments.

73. There are five departments in the NATC and they are:

(a) Mechanical Engineering

(b) Electrical and Electronic Engineering

(c) Shipbuilding and Repair Technology

(d) Building Maintenance and Management

(e) Business Studies

Each department offers either a 3 year or a 2 year course leading to the technicians diploma, depending on the applicants entry qualifications. Entry into the 3 year course requires passes in the Singapore-Cambridge General Certificate of Education (Ordinary Level) in appropriate subjects. Admission to the 3 year courses at the College is conducted jointly with the Vocational and Industrial Training Board, Singapore Polytechnic and junior colleges offering pre-university courses, through the Joint Admission Board of the Ministry of Education. Entry into the 2 year courses requires the higher qualification of the General Certificate of Education (Advanced Level) in appropriate subjects and in this case admission is conducted on a joint basis with the Singapore Polytechnic. Special entrance examinations are available for mature students without the requisite qualifications or for overseas students who possess qualifications other than the Singapore-Cambridge General Certificate of Education. English is required as an entry subject as all courses are conducted in this language.

74. In addition to the full time courses the College also offers part time evening courses as follows:

(a) Certificate and Diploma in Industrial Management

(b) Diploma in Marketing

(c) Lift and Escalator Maintenance

(d) Certificate in Ship Draughtsmanship

(e) Advanced Welding Technology

(f) Certificate in Naval Architecture (Endorsement course)

(g) Certificate in Ship Construction (Endorsement course)

The academic session begins in June with the first semester which ends in October and the second semester commences in October and ends in March. The part time courses are held on a 2 or 3 evenings a week basis during the semester periods and these are attended by those already employed and seeking formal qualifications or advancement. Fees for full time courses are currently S$420 per annum for Singapore citizens and S$600 per annum for non-Singapore citizens. In addition minor amounts are charged for examination fees, medical fees and computer fees.

75. The College has a Senate comprising the Principal as Chairman, all departmental heads (5), 2 senior lecturers from the English language and mathematic units, the librarian and 2 representatives of the Administration Department as well as the Registrar who also acts as Secretary. There are 7 standing committees, namely:

(a) Professional Committee

(b) Administration Committee

(c) Board of Admissions

(d) Board of Examiners

(e) Disciplinary Committee

(f) Scholarships Committee

(g) Canteen Committee

Each department has its own Advisory Committee to keep the curricula and teaching facilities under review and to ensure they are responsive to the needs of industry. The Heads of Department sit on their respective Committees as member/secretaries and the remainder of the committee members represent commerce and industry.

76. During the financial year ending 31 March 1980, the College had a total income of almost S$7.8 million of which S$6.6 million came from a Government grant to meet recurrent expenses and just under S$1 million came from course fees, with the balance coming from donations. In addition a separate fund existed which contained just under S$6.9 million for expansion projects, S$1.97 million development fund for the Shipbuilding and Repair Technology Department and just under S$0.5 million for the Building Maintenance and Management Department. There is a 5 year development and

expansion plan to meet the forecast increase to 7,000 in the student population over the next 6 years. Building has already commenced on the campus to provide extra administrative and staff offices, classrooms, workshops and laboratories and a commensurate increase in teaching staff and equipment is also planned. The Principal and all heads of departments are unanimous in their opinion that an increase and improvement in the workshops and laboratories are necessary to make the practical application of the taught theory meaningful. These views are substantiated by a newspaper 2/ report on the results of an extensive survey of industry by the Economic Research Centre of the National University of Singapore. The details of the report, released the day prior to the newspaper article, indicates firmly that the employers of graduates of Ngee Ann Technical College and Singapore Polytechnic find them generally lacking in practical applications of the theory for which they are well regarded.

77. In addition to the 5 diploma awarding departments the College also has several supporting units, namely, the English language unit, the mathematics and science unit, the education technology unit, a library resource centre, a computer centre and an industrial and business orientation section. The English, mathematics and computer units service the courses for the technical students while the industrial and business orientation section arranges working attachments in commerce and industry for the students during vacation. There is also an educational technology unit which provides a service to the teaching staff in the production of teaching aids. The total facilities currently available and those planned in the expansion programmes along with the student academic success rate have justified the College in applying for polytechnic status and there is optimism that it will be granted. The acceptance of the Ngee Ann diplomas as credits in British universities and polytechnic degree streams and their acceptance by the profess onal bodies should also support the application for the higher status.

78. It is the declared national policy for the 1980's to restructure the countries economy with industry giving emphasis to high technology and high value added processes. There will be an increase in the petroleum refineries capacity and it is expected there will be a growth in the downstream derivatives activity such as polymers and plastics production.

2/ The Sunday Times, 4 October 1981 - Singapore

A land reclamation programme is being pursued to further develop and extend the port and docks facilities of what is already one of the world's busiest ports. These and other points can be regarded as indicators that the present high economic growth rate (10.2 per cent in 1980) will be maintained and that institutions such as NATC will have developed to be ahead of demand for new and practically oriented technologies in their technician diploma streams.

79. The Ngee Ann Technical College is regarded as a national institution in that it provides the only source of education and training in certain disciplines. Where the courses it offers appear to duplicate those offered by Singapore Polytechnic it is generally acknowledged that the combined output of both institutions can be absorbed into the Singaporean industrial economy. The building programme to provide increased facilities for the larger student population has commenced and it is essential that this should include improved workshop and laboratory equipment to place more emphasis on the practical aspects of the technicians diploma. In parallel with this a staff development plan should be devised to up-date the industrial knowledge of the present staff and to train new staff members. The identification of workshop and laboratory equipment and the integration of this into the courses along with the complementary up-dating of the staff could provide a valuable area of technical co-operation with UNIDO and the details of this are outlined on page 52.

Vocational and Industrial Training Board (VITB)

80. The VITB came into being through a Statute law entitled The Vocational and Industrial Training Board Act, 1979, (Act 4 of 1979) dated 1 April 1979, which amalgamated the Adult Education Board and the Industrial Training Board to provide the new Board as the sole authority on vocational training. The amalgamation was a natural development brought about by the convergence of the activities of the two Boards, for the AEB formed in April 1960, to meet the literacy needs of out of school people, had expanded to conducting continuing education and pre-vocational courses in the mid-seventies, while the ITB formed in April 1973, had established the infrastructure of a national vocational training system. The ITB had devised a system of skills certification and public trade testing and was becoming more involved in industry-based training to support the upgrading of the workforce. It was recognized that the activities of the two Boards were becoming complementary and inseparable and the merger integrated the training and continuing education functions into one vocational training system and organizational framework. The Act provided the Board with authority on the registration and regulation of private vocational training institutions.

81. The functions and scope of the VITB as specified in the Act are:

(a) To provide for, promote, assist in and regulate the training or apprenticeship of persons employed in or intending to be employed in commerce or industry, and to upgrade the skills of such persons by providing advanced training in skilled work or otherwise;

(b) To establish the nature and length of the training for any employment in commerce or industry, and the further education to be associated with the training, the persons by and to whom the training ought to be given, the standards to be attained as a result of the training and the methods of ascertaining whether those standards have been attained;

(c) To conduct such programmes of further education as may be required from time to time.

82. The Board is responsible to the Ministry for Social Affairs and the Acting Minister became the chairman at its inception on 1 April 1979 for a three-year term of office. The Minister, in accordance with the Act, appointed members to the Board on a tripartite basis with members from the Ministries of Labour, Trade and Industry, Education, and Defence representing Government,

three representatives from the employers organizations, three representatives from the National Trade Union Congress and six members from the industrial and commercial sectors. The Director of vocational and industrial training is also a member of the Board. The Board appointed an Establishment Committee and a Finance Committee from amongst its members and delegated relevant areas of responsibility to them. To ensure that the vocational training and certification controlled by the Director was responsive to the needs of industry and commerce, tripartite trade advisory committees were formed from people recognized as technically competent in their respective skills areas. The 13 committees so formed each have a tenure of three years from their appointment.

83. The technical advisory committees (annex XXIII) were given responsibility for advising on the courses to be offered, the skills content in the courses, endorsement of the syllabi, curricula and modules for the courses and to make recommendations on the equipment lists, physical facilities and staff training for the approved courses. Sub-committees were formed by the TACs from among their members, to undertake specific areas of responsibility and these were carried out in close liaison with expert committees appointed by relevant employer, association and industry. The Certification Committee, established for the certification of trade skills, was formed, and a member of the Board was appointed as chairman. The other members comprised the chairmen of each TAC, representatives of the Public Service Commission, Economic Development Board, Singapore Institute of Standards and Industrial Research, representatives of employers, NTUC and authorities responsible for the licencing of certain skilled occupations.

84. The Director of vocational and industrial training is responsible for implementing the functions of the Board and for this purpose he has at present 17 vocational training centres and control of a comprehensive infrastructure (annex XXIV). An expansion programme is being implemented to increase the number of vocational training institutes and these are being built at strategic points on the island. National trade standards have been established with a system of certification at three grades, which are:

National Trade Certificate Grade 1 (NTC.1)

Designates a highly skilled level comparable to that of a master craftsman, and attained only after several years of experience and perfection in a particular skill.

National Trade Certificate Grade 2 (NTC.2)

Designates the skill level of a fully trained and competent craftsman, normally attained on completion of an apprenticeship or through a number of years of work experience.

National Trade Certificate Grade 3 (NTC.3)

The semi-skilled level normally attained by completing basic training at a vocational institute or at least one year of an apprenticeship programme.

Tests for NTC.1 have not yet been introduced and work is being carried out to define the standards inherent in this top grade.

85. The trade certification examination processes are based on the contents of the various curricula and designed to ensure that the standards of skill expected in industry are attained. The training curricula are designed in modular form and used totally in the full-time courses or in units for skills up-grading courses. Both the curricular and the associated trade testing and certification processes are under regular review and responsive to feed-back from industry. A question bank for practical and theoretical questions is being developed but a system of coding storage and retrieval has yet to be finalized.

86. The VITB is the national body concerned with the quantitative and qualitative regulation of skilled workers and this work is outside of the scope of this mission. The Board could however provide a training situation for management having responsibilities for curriculum development, national training standards and testing procedures. The organization and activities of the VITB could serve as a model for other countries.

Singapore Polytechnic

87. The Singapore Polytechnic was established in October 1954, by an act passed by the Legislative Council and its first academic term commenced in November 1958. Since that time the Polytechnic has undergone many changes in its subjects and levels of learning to arrive at its present position. Up to 1963-1964 craft courses were available at the Polytechnic but a change in emphasis saw these transferred to the Singapore Vocational Institute. By special arrangements made with the University, the Polytechnic commenced degree courses in engineering, accountancy and architecture from the 1965-1966 session

as well as offering courses at lower grades. Further reorganization occurred in May 1969, however, and the degree courses were transferred to the University, to be replaced by the Industrial Technicians Certificate courses at the Polytechnic in the 1969-1970 session. Overall rationalization in 1975 resulted in the Technician Certificate courses being transferred to the Industrial Training Board and the Polytechnic adopted its present role of offering Technician Diploma courses.

88. On 26 February 1980, the Singapore Polytechnic (Amendment) Act, 1980 established the Polytechnic in its present-day form, with a Board of Governors of the Singapore Polytechnic as a corporate body of tripartite composition. The Minister-in-Charge of NGEE ANN TECHNICAL COLLEGE/SINGAPORE POLYTECHNIC/ VOCATIONAL AND INDUSTRIAL TRAINING BOARD appointed all members of the Board, with the exception of the Principal of the Polytechnic who became a member by virtue of his office, and inaugurated the Board on 5 April 1980. The Board currently has a Chairman, Deputy Chairman, Secretary and 15 members representing Government, Employers and Trade Unions. The Board appointed two standing committees, the Administrative Committee and the Professional Committee for the effective co-ordination of administrative and academic matters. A Development Committee was appointed on 27 January 1981, to co-ordinate the physical development and expansion programmes for the Polytechnic over the next five years.

89. The Polytechnic comprises the following departments and divisions:

(a) Civil Engineering and Building Department

(b) Electrical Engineering Department

(c) Electronics and Communications Engineering Department

(d) Mechanical and Production Engineering Department

(e) Nautical Studies Department

(f) Continuing Education Department

(g) Marine Engineering Division

(h) Chemical Process Technology Division

There are also three service units to the above departments and divisions and they are:

(i) Mathematics and Science Division

(j) English Language Unit

(k) Audio-visual aids unit.

90. With the exception of the Continuing Education Department each of the departments and divisions listed (a) to (h) in the previous paragraph have Advisory Committees to assist and advise on matters of curricula, course structure, equipment and practical training activities. The Polytechnic offers a wide range of courses leading to Technicians Diplomas and these courses are similar in status to those offered at Ngee Ann Technical College but unnecessary duplication of courses is avoided. The courses in the Nautical Studies Department qualify students for a Certificate of the Polytechnic and prepare them for the examinations and qualifications of the Marine Department and the Telecommunications Authority of Singapore. A full list of courses and awards is given in annex XXV.

91. The technician diplomas awarded by the Polytechnic qualify for some exemptions in the respective professional bodies examinations and they are also accepted as a means of entry into degree courses, usually at the second year level. While the needs of the students are being met by the full-time courses, those already in employment have the opportunity to up-grade their skills and academic levels through the Department of Continuing Education which provides day release and evening courses. In addition to the regular part-time diploma courses listed in annex XXV the Polytechnic also offers many specialist subject courses, endorsement courses and post diploma courses on a part-time basis.

92. A considerable programme of expansion is planned over the next five years and building extensions will take place in the present campus. The expected student population in 1986 is expected to reach 15,000, comprising 9,000 full-time and 1,500 part-time students. There will be a commensurate increase in staff strength to 700 and newly equipped workshops and laboratories will be added to give emphasis to the practical aspects of the courses. As the expansion programme takes place the courses will be restructured and up-graded and there is a staff development plan to be implemented to enhance the skills and knowledge of the staff. As some difficulty is anticipated in securing the additional staff (about 350) a scheme has been proposed to offer scholarships to diploma graduates to read for degrees. The staff development programme is expected to cost S$7 million a year for the next five years.

93. It is evident that there will be considerable changes in the Singapore Polytechnic, both in magnitude and character, over the next five years and the academic staff are very conscious of the need to develop into the high technology sector with the courses offered. The Polytechnic already has a national role in its fields of learning and also has the capability to make a regional contribution. The capabilities, nationally and regionally, will be considerably enhanced when the expansion programme is completed and particularly if the workshops and laboratories are improved and equipped to meet the new demands. Bearing in mind the results of the industrial survey by the Economic Research Centre of the National University of Singapore, in October 1981, that there is an urgent need to improve the practical content of the technician diploma courses, priority should be given to this issue. Discussions with the Deputy Vice-Principal and the heads of department resulted in the identification of areas of technical co-operation with UNIDO and details of these are given on page 54.

Singapore Institute of Standards and Industrial Research (SISIR)

94. The SISIR is a statute body which, in addition to the process of standard setting and quality certification, has an important role in industrial research and development directed towards high technology and high value added production. The institute is in the mid-term position in its second Five Year Development Plan (1978/79-1982/83) and this is closely integrated with the Government declared policy for industrial development. During 1980 Singapore's economic growth in the services provided by SISIR to industry, trade and the Government to give a total value of S$6.58 million. This remarkable growth rate in SISIR is indicative of the key role they are playing in a dynamic economy.

95. The development plans of the institute are designed to:

(a) develop specialized fields of expertise such as metrology, non-destructive testing and quality assurance for the metal, construction, aerospace, precision engineering and other industrial activities.

(b) commercialize the research and development results.

(c) develop engineering design capabilities to help industries move towards capital intensive operations and develop new products.

(d) up-grade quality control systems, extension and other testing services.

(e) develop the institute as a premier research organization and a centre of excellence for technical consultancy services.

96. The headquarters of the institute is situated in the heart of Singapore, on a site of approximately 22,000 square metres which provides office accommodation and laboratory facilities. The staff complement exceeds 300 and of these about 130 are qualified professional technical people. In addition there is usually a variable input from experts from foreign laboratories to complement the permanent staff. During the financial year ending 31 March 1981, there were two inputs from the UNDP one in the field of applied metrology with particular emphasis on microelectronics and numerical control machine technology. The other UNDP input came through the appointment of expert services to assist in drawing up the plans for the development of the Materials Technology and Applications Centre for the broad areas of metals, plastics, chemical analyses and electronic materials.

97. During 1980/81 the institute benefited from capital investment which provided a scanning electron microscope for the metallurgical field in capital intensive high technology industries. In plastics technology, the research and development aspects were the subject of a special study resulting in a pilot plant project being initiated with injection moulding facilities. The SISIR is international in its activities and has forged technical co-operation links with counterpart organizations in the United Kingdom, the Federal Republic of Germany, United States of America, New Zealand and Holland. Arrangements have also been made with Japan and the Federal Republic of Germany for Singapore manufacturers, under the aegis of SISIR, to apply the appropriate quality assurance mark to goods exported to those countries. The SISIR has also been authorized to undertake inspection and certification for several of the purchasing agencies in the United Kingdom, Federal Republic of Germany, Canada, Australia and Saudi Arabia.

98. The SISIR comprises several departments and these are shown in annex XXVI. All departments have extensive resources of equipment with which to conduct their research and development programmes and where a research project materializes into a viable commericial proposition it is transferred to the industrial sector for exploitation thus leaving SISIR to concentrate on further research activities. Plans have been drawn up to build new headquarters for the Institute on land in Kent Ridge, adjacent to the National University of Singapore when links will be firmly established between the research work being done in both organizations. A relationship has been established between the University and SISIR to enable graduates in engineering and physical sciences to have the opportunity to experience in industrial research and development before entering industry.

99. A regular training programme in specialized subjects such as non-destructive testing, quality control, metallurgy and production technology also arranged by SISIR to disseminate information on new techniques and to stimulate interest in technological advancement in industry. The range of courses offered is wide and covers several technical fields and in most cases these are conducted by officers from the staff, although external agencies such as IAEA have participated on a joint basis to provide a regional course on non-destructive testing. The capability exists to conduct training programmes in high technology subjects and these can be well reinforced by practical application and demonstration in the well

equipped laboratories. The facilities of SISIR can be regarded as a valuable resource for training both nationally and regionally.

100. Discussions with senior staff at SISIR highlighted the need to develop as soon as possible a resource for Materials Technology and Applications Centre and this would require a detailed investigation to establish the parameters and scope of such a unit along with the subsequent specification of equipment for the laboratory. It is not clear whether a project proposal has been prepared for this and is now lying dormant somewhere and perhaps is now in need of revision, or whether this initial work remains to be done. Either way it would appear that the possibility of technical co-operation exists and a proposal on this is given on page 54.

National University of Singapore (NUS)

101. The National University of Singapore was not included in the list of institutions to be visited on the mission largely because of its concentration of learning in the medical and dental professions. It does however have a faculty of engineering and through the Ministry of Finance approval was given and arrangements were made by the Ministry of Education to make a brief visit for the purpose of looking at these facilities so that an overall impression could be gained of the total engineering development and training programme from craft skills through technician diploma to degrees in engineering.

102. The visit was limited to two hours because of pressure of other appointments and this time was spent in the workshops and laboratories. In particular the chemical engineering process laboratory was examined in detail to see the range of process control systems utilized in the course for a degree in chemical engineering. This was particularly relevant to the part of the mission concerned with Singapore Polytechnic where there is an important need to improve the laboratory facilities for the technicians diploma in chemical process technology. It was evident from this visit that a gap exists in the resources available for the technician diploma course at Singapore Polytechnic and this is covered under the section on possible areas of co-operation on page 54.

103. In passing it should be recorded that the buildings and facilities seen at NUS were of a very high standard and the calibre of the staff with whom discussions were held left little doubt that students at the University are assured of a substantial base of learning.

Singapore Institute of Management

104. The Singapore Institute of Management is an independent professional national management body established in 1964 and operating on a non-profit making basis with the aim of developing the management expertise necessary for the growth of Singapore's economy. The policies of SIM are determined by a Governing Council of elected members and members appointed to represent, the National University of Singapore, Chembers of Commerce, Economic Development Board and the Singapore Manufacturers' Association. The headquarters of SIM is situated in a modern office block, in the business area of Singapore, and besides the office accommodation there are several lecture rooms fully equipped with overhead projectors and wyte boards and a well stocked library. The subscribing membership roll includes over 1,200 members and over 300 institutions or organizations.

105. An Executive Director heads the SIM organization with a full time staff of 24, including those responsible for organizing and administering the training programmes. The Institute conducts a wide variety of programmes and activities in Singapore and in addition it has regional commitments through its membership of the Asian Association of Management Organizations. The diploma programmes offered by SIM have been recognized by the Skills Development Fund (para. 112) thus enabling employers to claim subsidies for their employees attending. The Institute's diploma in management studies has also been accepted as meeting the requirements for membership of the British Institute of Management. The Institute is also an overseas member of the British Institute of Management and a chartered member of the American Management Associations thus giving members access to the resources of the two organizations.

106. As an independent, non-profit making body the SIM depends upon its membership subscriptions and course fees to provide the bulk of its operating capital. The total income from these, and other sources such as rents, interest and entrance fees amounted to just over S$1.5 million for the year ended 31 December 1980. After all expenses for the year had

been met a surplus balance of over S$200,000 was available for transfer to the general fund which is maintained at a reasonable level to meet future demands. The training courses available are issued in programme form for the two periods April to September and October to March and they are open to members and non-members with the fees for members being lower than for non-members. The courses offered during the period April 1981 to March 1982 are listed in annex XXVII in addition to which the Institute offers in-company management development programmes on request and to the specific requirements of the company.

107. As a member of the Asian Association of Management Organizations the SIM has a special responsibility to host a meeting of member countries for a two week workshop on management development in February 1982. A similar workshop was arranged in 1978 with the Malaysian Institute of Management as the hosts and this was attended by representatives from Indonesia, Singapore, Malaysia, Thailand and Hong Kong (Japan, Korea, India, Australia and Philippines were not represented). It is planned to arrange for the February 1982 workshop to be held in three residential areas, one of which will be in a resort area in Malaysia, one in Singapore and one in Sentosa, an island off Singapore with the final conference and proposals of all participants to be in Singapore. This regional involvement is a valuable facet of the SIM activities giving its members the benefit of contemporary thinking in neighbouring countries.

108. The resources available to SIM in the premises it occupies are sufficient for it to operate several training programmes in parallel without any dependency on any outside agency. The training staff of SIM are available to conduct many of the courses but visiting lecturers are utilized and bring to the content of the courses the reality of the industrial or commercial activity. The Institute could be considered as a national resource in its capacity of management development for the private sector and equally it could be utilized as a regional resource in the mounting of workshops, seminars or special training courses, providing these could be arranged and programmed well in advance. The Institute would benefit from a short and intensive input to develop the training techniques and training aids aspects of its programmes and the extent of this is shown on page 55.

The National Productivity Board (NPB)

109. The National Productivity Board is a statutory body established under the National Productivity Act of 1972 and is tri-partite in composition with representatives from Government, employers, trade unions and individuals with professional or academic interests associated with productivity improvement. Although the Board has now been operational for some years, it is only within the last fortnight, end of September 1981, that a further important development took place with the formation of a National Productivity Council which is expected to be chaired by the Minister of State for Labour. The four-fold objectives of the NPB are:

1. To promote productivity consciousness among managers, trade union leaders and workers.

2. To provide training facilities for managerial, supervisory and technical personnel in all relevant aspects of modern management and technology.

3. To render management and technical consultancy services to help industrial enterprises achieve a higher level of productivity.

4. To foster good industrial relations by promoting the formation of joint consultative councils or productivity committees.

110. The Board has its offices in a modern office block, near the commercial centre of the city, where all of its departments are centralized with full administrative and supporting services. The Board is in receipt of some funds from the Government but during the financial year 1979/80 just under S$1 million of the income was derived from course fees, seminars and conferences, and consultancy fees. During the same fiscal year the Government contribution to the operating costs of the Board was just under S$2 million and it is expected that the proportion contributed by the Government will diminish in future years as the Board's activities increase. The Board carries out its functions of training consultancy and advisory assistance through several departments (annex XXVIII) one of which, the Labour Management Relations Department, was only formed in early August 1981.

111. A regional body, the Asian Productivity Organization (APO), was formed in 1961 to promote productivity and growth in Asia and the Pacific. Singapore is represented in this organization by the NPB which acts as

the implementing agency for all APO projects, as well as providing the means for local companies or organizations to take advantage of the facilities of APO. With rather similar objectives, a National Productivity Association was formed in Singapore as an affiliated body of the NPB to promote and encourage public consciousness of the need for productivity. Members of the Association benefit from concessionary rates for the NPB training programmes and enjoy borrowing rights from the library or stock of educational films.

112. In general, training in Singapore can be subsidised from the Skill Development Fund which is a fund to which employers are required to contribute at the rate of 4 per cent of their total payroll for employees earning less than S$750 per month. Requests for assistance towards the costs of providing training programmes or of sending employees to attend recognized courses are considered by the management of the Skill Development Fund and NPB benefits in this respect. The NPB is also currently in receipt of technical assistance from the UNDP fund with ILO as the implementing agency with one expert attached to the Management Services and Supervisory Development Unit. As an indication of the Board's intent to make people aware of the needs for greater productivity a Committee on Productivity was formed in April 1981, with responsibility to formulate a set of recommendations to improve work attitudes, productivity and labour-management relations in Singapore. The findings of this committee have been published and issued 11 June 1981 with the view to opinions and suggestions from the readers. Among other things the committee recommended the formation of a tri-partite Productivity Council (para. 108)

113. A wide variety of training courses are offered, during the day and evenings, by the several departments of NPB and mostly these are designed in modular form to be more responsive to the demands of the trainees. All courses are conducted in English and some of these repeated in Mandarin with audio-visual aids and other training aids being available in both cases. A calendar of training courses is prepared in advance for the two parts of the year, January to June and July to December, based on the expressed needs of industry and commerce in a previously conducted survey. The programme of training courses available during 1981 appear in annex XXIX, but in addition the board offers the following services:

1. Advisory Services in Productivity Committees.

(a) Prompting the concept of productivity committees.

(b) Assistance in developing, and training the members of, productivity committees.

(c) Training of trainers in productivity committees.

2. Consultancy services in:

(a) Industrial engineering and Production Management.

(b) General Management, Marketing Management and Administration.

(c) Low Cost Automation and Production Technology.

(d) Management Accounting and Financial Management.

(e) Management Information Services.

3. In-Company Training Services in:

(a) General Management, Marketing Management, Personnel Management and Administration.

(b) Management Accounting and Financial Management.

(c) Industrial Engineering and Production Management.

(d) Supervisory Development.

(e) Industrial Health and Safety.

4. Training-within-Industry (TWI) Services.

(a) Basic "RIMS" (relations, instructions and communication, methods and safety) programme.

114. The newly formed Labour Management Relations Department is being organized to operate in three broad areas which are:

(a) Joint Consultation - work excellent committees.

(b) Performance Appraisal - appraisal and development

(c) Group dynamics.

The new department has commenced its contribution to the Board's activities and will undoubtedly feature in the training programmes in the near future.

115. The Board offers a wide range of training programmes on a national basis and this capability could be extended to become a regional resource for specific training programmes. The computer training centre in particular is well staffed and equipped to provide a needed facility in the region. Discussions with department heads highlighted areas where it was felt that the capabilities could be improved with the benefits of short inputs of technical co-operation and these are outlined in page 56.

Summary of Findings - Malaysia

Institution	Capability as a Centre			Qualifications (if any) on Assessment
	National	Regional	Inter-regional	
University of Technology	Yes(1)	Yes(2)	No	(1) Already operating in this capacity. (2) Subject to the completion of the development plans and the improvements indicated by the technical inputs. Also subject to any awards made being recognised in trainees home country.
National Institute of Public Administration	Yes(1)	Yes(1)	No	(1) Already operating in this capacity. (2) Already contributing to the Asia and Pacific Region for certain courses. Some inputs needed.
Palm Oil Research Institute	Yes(1)	Yes(2)	Yes(2)	(1) Already operating in this capacity. (2) Has limited resources to operate in this capacity at present buw ill improve dramatically with the new headquarters (Sept. 1983) and the input recommended.
Malaysian Institute of Management	Yes(1)	No(2)	No(2)	(1) Operating now in this capacity. (2) Present resources inadequate should review after proposed development plan implemented. Small inputs recommended to improve capability.
National Productivity Centre	Yes(1)	Yes(2)	No	(1) Already operating in this capacity. (2) Subject to the completion of the development programme and the improvements indicated by the technical inputs.
Rubber Research Institute of Malaysia	Yes(1)	Yes(2)	Yes(2)	(1) Already operating in this capacity. (2) Some overseas students have attended courses but the capability exists to expand this activity. The inputs recommended would greatly enhance the national programme.
Standards and Industrial Research INstitute of Malaysia	Yes(1)	No(2)	No(2)	(1) Already operating in this capacity. (2) To be reviewed after the expansion programme is completed and the training activity is operational.
Asia and Pacific Development Centre	Yes(1)	Yes(2)	Yes(3)	(1) Could operate in this capacity. (2) Already designated in and operating in this capacity. (3) Could operate in this capacity.
Mara Skills Centre, Entrepreneur Division	Yes(1)	No(2)	No(2)	(1) Already operating in this capacity. (2) System is unique to Malaysia.

Summary of Findings - Singapore

Institution	Capability as a Centre			Qualifications (if any) on Assessment
	National	Regional	Inter-regional	
Ngee Ann Technical College	Yes(1)	Yes(2)	No	(1) Already operating in this capacity. (2) Could operate in this capacity after the extension programme is completed and practical content is given more emphasis with improved workshop/ laboratory facilities and indicated by the technical inputs and also that any awards made would be recognised in trainees home country
Vocational and Industrial Training Board	Yes(1)	Yes(2)	Yes(2)	(1) Already operating in this capacity. (2) Could serve as a model for countries developing national bodies to regulate, standardise and test vocational training. Could promote seminars on vocational training for managers responsible for this function.
Singapore Polytechnic	Yes(1)	Yes(2)	No	(1) Already operating in this capacity. (2) Qualifications the same as Ngee Ann Technical College.
Singapore Institute of Standards and Industrial Research	Yes(1)	Yes(2)	No(3)	(1) Already operating in this capacity. (2) Capability exists and international relationships already firmly established should be conducive to become a regional resource. (3) Not envisaged at this stage.
National University of Singapore	Yes(1)	(2)	(2)	(1) Already operating in this capacity. (2) Outside the scope of the mission.
Singapore Institute of Management	Yes(1)	Yes(2)	No	(1) Already operating in this capacity. (2) Already has regional commitments through its role in the Asian Association of Management Organisations. Could be regarded as a regional resource providing certificates or diplomas would be recognised in the trainees home country.
The National Productivity Board	Yes(1)	Yes(2)	No	(1) Already operating in this capacity. (2) Could be regarded as a regional resource for the training course listed in Annex XXIX or as a model for countries developing national productivity board.

AREAS OF POSSIBLE TECHNICAL CO-OPERATION BETWEEN UNIDO AND THE INSTITUTIONS TO ENHANCE THEIR CAPABILITIES

116. The technical inputs shown in this section with the exception of paragraph 130 and paragraph 128 which is treated separately are summed up at the end of the section.

The University of Technology, Malaysia

117. The development of the new campus in Johore Bahru is a vital factor in the chain of events leading to an advancement in the technological capacity of the University to not only meet, but anticipate, the demands of industry. The University Deans and Deputy Vice Chancellor clearly stated the changes and developments necessary and lengthy discussions and observations confirmed the substance of their proposals. To assist in the rapid benefit return on these ideas several areas of technical co-operation were identified and these are specified below.

118. Technical inputs

(a) 1 - expert in industrial organization and planning to assist in networking and co-ordinating the complex logistics associated with the transfer to, and the utilization of, new resources in Johore Bahru, to ensure minimum disruption to the academic programme and retention of appropriate facilities on the existing Kuala Lumpur campus. 18 man months.

(b) 1 - expert in industrial research to assist in planning and designing a research laboratory facility to provide a linkage with the industrial sector by a process of industrially oriented research and the provision of a consultancy service to industry. It is proposed that this research resource will have faculty status with a Dean and appropriate Research Officers and Technicians. 12 man months.

(c) 1 - expert in petroleum and natural gas engineering to assist this department in the engineering faculty to develop a curriculum and research laboratories appropriate to Malaysia's industrial development needs and responsive to the exploitation of mineral oil and natural gas resources in Malaysia. 6 months

(d) 1 - expert in marine engineering to assist in developing a curriculum and research laboratories appropriate to Malaysia's maritime activities. 6 months.

(e) 1 - expert in training methodology. 3 months.

2 - fellowships of 3 months each for counterparts to posts (c) and (d). 6 man months.

The National Institute of Public Administration (INTAN)

119. The development of the 135 acre site will provide INTAN with improved facilities which will enhance the capability of the institute as a national centre and also as a regional centre in respect of its present role of promoting training courses for Asia and the Pacific region. Lengthy discussions with the Director, Deputy Directors and Centre Heads established the need for technical co-operation inputs to aid the expansion programme and strengthen some of the existing activities. The areas where these inputs would be beneficial are given below.

120. Technical inputs

(a) 1 - expert in production management to assist in the injection of an industrial approach to the course content and to develop the appropriate training resources. 6 months.

(b) 1 - expert in training methodology to assist existing staff to improve the training programmes and provide the means for new staff to be trained in training methodology upon recruitment. 6 months.

(c) 1 - expert in computer programming to assist in the development of course content and training resources to meet the needs for people skilled in computer applications. 6 months

(d) 1 - expert in industrial manpower planning to assist in the development of curriculum and resources. 6 months.

(e) 2 - fellowships of 2 months each for the counterparts of post (c). These fellowships may utilize the facilities at the National Productivity Board, Singapore. 4 man months.

Palm Oil Research Institute of Malaysia

121. As Malaysia is the world's largest producer and exporter of palm oil, the Palm Oil Research Institute of Malaysia has an important role to play in maintaining the lead in research and development in this field. The temporary laboratories accommodation provides a constraint that will be removed when the new headquarters programme, scheduled for 1983, is completed. The technical advisory services and the collation and dissemination of information to consumers is considered an important feature in promoting market developments. These activities, and others, will be stimulated when PORIM appoints someone to organize and control the training function and concurrent with this appointment the following technical assistance is regarded as important.

122. Technical inputs

(a) 1 - expert in training methodology to assist the training officer appointed to develop the resources and the training function. 12 months.

(b) 1 - fellowship for the counterpart 3 months.

Malaysian Institute of Management (MIM)

123. The MIM fulfils an important function in the provision of a vast range of courses designed to develop management capability in the private sector. This valuable contribution to the national development policy would benefit from a small technical co-operation programme which is aimed at improving the training techniques of the existing staff and making provision for the training of newly recruited staff in the expansion programme.

124. Technical inputs

(a)	1 - training methodology expert	3 months
(b)	Equipment for training - 16 mm films, slides, transparencies and etc. to be identified by the expert	US$10,000

The National Productivity Centre (NPC)

125. The NPC attracts a large number of trainees to its wide range of courses and through these makes a contribution to management development in the industrial sector. Discussions and observations indicated the need to strengthen certain areas in the training programmes and in view of the building expansion plans it would seem appropriate to supply the technical inputs to ensure that the corresponding staff development targets are met. Given that these events occur as planned the capability of the NPC should be improved in its service to industry.

126. Technical inputs

(a)	1 - expert in production management and industrial engineering to develop the course requirements for this new training programme which has recently been introduced by a lecturer recruited from the United Kingdom	12 months
(b)	1 - expert in training methodology	3 months

Rubber Research Institute of Malaysia (RRIM)

127. The RRIM undoubtedly has a leading role in the world for rubber technology and research, and its very diverse range of research activities supported by actively applied, well designed training programmes will ensure that this situation is maintained. Lengthy discussions with the Head of Training, Personnel and Staff Development Division and the Group Training Officer led to a writeen proposal for improvements in the training facility calculated to aid the many Malaysians employed in the industry. This proposal prepared by the two officers referred to, and other technical staff, is attached as Annex XXX. If the contents of this proposal are adopted then a small input of technical co-operation to coincide with it should result in a considerable improvement in the training resources.

128. Technical inputs

(a)	1 - expert in rubber (or chemical) process technology engineer to advise on the design and utilization of the proposed pilot plants as training resources and to co-operate with the Group Training Officer, or some other person, in the preparation of appropriate training materials for this purpose	12 months
(b)	1 - expert in training methodology to work in conjunction with the expert and counterpart in post (a) to ensure maximum benefit is derived from this training resource and to improve the training activity for other training programmes	6 months
(c)	2 fellowships each of 3 months for the counterparts in posts (a) and (b)	6 man months

Standards and Industrial Research Institute of Malaysia (SIRIM)

129. The vital contribution that can be made to industrial development by SIRIM will be fully realized when the building development programmes is completed and a competent training capacity has been developed to provide a direct linkage with the industrial and commercial sectors. A project (DP/MAL/80/001), entitled Training of Professional Staff for the Standards and Industrial Research Institute of Malaysia, is currently implementing 50 fellowship programmes at a cost of US$265,000. It is recommended that the vacant post for a Training Officer be filled as soon as possible, and in anticipation of this the project document be revised to include new inputs as show below.

130. Technical inputs

(a)	1 - expert in training techniques and curriculum development to assist in the development of training programmes designed to promote industrial productivity and quality	12 months
(b)	1 - fellowship of 3 months for the counterpart to post (a)	

(c) Training equipment to the value of US$50,000 to be specified by the expert in co-operation with his counterpart

It is estimated that the costs of (a) and (b) plus the equipment component will total US$143,150 giving a new revised project total of US$408,150.

Asia and Pacific Development Centre (APDC)

131. The APDC is already operating as a regional centre under the aegis of ESCAP/UNDP and no technical inputs are required at this time.

Mara Skills Centre (Entrepreneur Division)

132. The activities of the MARA skills centre training programmes were outside the scope of the mission but the Entrepreneur Division was visited and discussions about the programme took place. The Deputy Director of the Entrepreneur Development Division expressed the need for a technical input to this field of work and the discussions on this indicated that it would be beneficial to the programme.

133. Technical input

1 - expert in industrial entreprenuer development programmes with a bias to behavioural sciences and motivation factors — 6 months

Singapore

134. Various components of technical assistance were identified for five of the seven institutes visited in Singapore. These are indicated against each institution where they apply and summated at the end of this section.

Ngee Ann Technical College (NATC)

135. The next three or four years will see considerable change in the NATC, both in magnitude and the content of courses offered, as plans are implemented to expand the output of students with more practical bias. The changes required to accommodate newer technologies will be aided by the following technical inputs.

136. Technical inputs

(a) 1 - expert in control engineering to assist in the re-structuring of the options in the final year of the electronics course when the present electrical

and electronic engineering course is divided into two distinct courses. The identification of industrial applications equipment for the laboratory will be an important component of this post 12 months

(b) 1 - expert in mechanical engineering with a bias in instrumentation control systems and loops, and pneumatic and hydraulic actuators to re-structure the course content with a concomitant identification of the industrial systems equipment for the workshops and laboratories 12 months

(c) 1 - fellowship of 4 months for the Department of Business Studies, to up-date effective Human Relations, Industrial Democracy, Group Dynamics, Behavioural Sciences and Motivation Techniques

(d) 1 - fellowship of 4 months for the Department of Building to study Modular Training Techniques and their Application to part-time courses for those already employed

(e) 1 - fellowship of 4 months for the Department of Building to study the management and maintenance and services in high rise buildings

(f) 1 - fellowship of 12 months for the Department of Building for Post-Graduate Study in Plumbing/Sanitary Engineering in Preparation for the Introduction of this subject in 1984.

Fellowships c + d + e + f 24 man months

VOCATIONAL AND INDUSTRIAL TRAINING BOARD (V.I.T.B.)

137. The product of the V.I.T.B., skilled craftsmen, falls outside the scope of the mission which was focussed on technician and management training. No technical co-operation programme is required as the V.I.T.B is functioning very effectively in its role described earlier in the report.

SINGAPORE POLYTECHNIC

138. The Polytechnic has embarked on a programme of expansion which will double the staff strength by 1986 and add considerably to the resources of workshops and laboratories in keeping with the need to reinforce the practical aspects of the courses. The areas identified where technical assistance could advance this process are given below

TECHNICAL INPUTS:

139. (a) 1 - Marine Engineering Expert with Experience in computerized Engine Room Control Systems and Ancillary Engine Room Equipment to assist the Marine Engineering Department to Re-structure the Workshops and Laboratories and modify the curriculum to Accommodate this Maritime Technological Development 12 months

(b) 1 - Navigational Electronics Aids Expert to Assist the Nautical Department to Restructure the Workshops and Laboratories and Modify the curriculum to introduce computerized Deck Control Systems and Electronic Navigational Equipment such as Automatic Relative Plotting Aids, Knowledge of which are a Pre-requisite for Mate and Master tickets awarded by the Maritime Boards and Imco Agreements 12 months

(c) 1 - Industrial Chemical Process Laboratory Expert to develop the Workshop and Laboratory Facilities to provide Distillation/ Absorption matter transfer systems with reflux loops and control techniques along with fluid flow pressure drop measuring and cascade control methods, as required to up-date the chemical technology course in anticipation of development in this industry in Singapore 12 months

SINGAPORE INSTITUTE OF STANDARDS AND INDUSTRIAL RESEARCH (S.I.S.I.R.)

140. The international relationships established by S.I.S.I.R. are indicative of the standing of this institution and its capability in many fields. In keeping with the national policy S.I.S.I.R. is preparing

to develop a Materials Technology and Applications Centre for the purpose of research and development leading to high technology, capital intensive and high value added processes. In definition of the requirements of such a laboratory calls for a detailed study of future industrial development and the possible applications of new and modified materials. This activity could be the subject of a technical co-operative input and this is given below.

TECHNICAL INPUTS

141. (a) 1 - Materials Technology Expert to establish the scope and requirements of the laboratory equipment to provide a tangible support and Advisory Service to Industry in the Utilization of new materials or the application of existing and modified materials to new uses 12 months

(b) 1 - Expert in training methodology to assist in the preparation of training materials and techniques related to post a) 6 months

NATIONAL UNIVERSITY OF SINGAPORE

142. This visit, although outside the scope of the mission, proved valuable in gaining an appreciation of the total scope of training and education in the engineering and chemical process disciplines. In particular it highlighted the needs for improvements in the workshop/ laboratory facilities at Singapore Polytechnic Chemical Technology course and these points are covered under that heading. There are no inputs required at the University.

SINGAPORE INSTITUTE OF MANAGEMENT

143. The S.I.M. is self-sufficient nationally and has regional links through the Asian Association of Management Organization (A.A.M.O.). Benefits would be derived by the management of Singapore industries using S.I.M. resources if a small technical input was made to up-date the training methods and introduce training aids and this is outlined below.

TECHNICAL INPUTS

144. (a) 1 - Expert in Training Aids 3 months

(b) Co-ordination and Assistance in the organization and implementation of a Regional Workshop which S.I.M. is hosting on behalf of A.A.M.O. for 2 weeks in February 1982 on Industrial Management.

THE NATIONAL PRODUCTIVITY BOARD (N.P.B.)

145. The N.P.B. already with considerable potential in the wide range of courses and activities it offers is, nevertheless, conscious of the need to anticipate changes in industrial techniques. With these considerations as a focal point in the discussions with the various departmental heads, it emerged that technical co-operation could usefully be entered into in preparation for new or extended industrial developments in Singapore, and these are given below.

TECHNICAL INPUTS

146. (a) 1 - Industrial Engineer Expert to assist in identifying key elements in the industrial applications of Robots and to integrate these into a training programme. Also to identify the key elements in computerized production control systems for engineering processes for the purpose of developing a training programme 12 months

(b) 1 - Energy Conservation Expert to assist in developing a training approach for industrial economics in energy 6 months

(c) 1 - Instructor training expert to co-operate with the supervisory development department in stregthening this component of their activities 3 months

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

PROJECT PROPOSAL

Country:	Malaysia
Project No.:	
Scheduled start:	May 1982
Scheduled completion:	December 1983
Host Government Counterpart Agency:	Ministry of Education/University of Technology
Project title:	Assistance to develop existing potential and enhance the capabilities of the University of Technology. As a source of supply of industrial technicians and technologists.
UNIDO contribution:	US$350,100
Government contribution:	In kind
Proposal submitted by:	Robert Bell
Date of submission:	24 October 1981

1. Background and justification

Social and economic growth can only be maintained when a nation's manpower development programme quantitatively and qualitatively meets its needs, and is responsive to technological change. It is also important to a nation that its trading partners within a region should enjoy similar growth which will support and stimulate trade, thus sustaining the process of growth. It is recognized that an interchange of industrial skills and experience between nations will be beneficial to the furthering of these ideals and that the transfer process will be enhanced if it takes place in an environment where the social and cultural conditions are somewhat similar to those in the trainees' own countries.

Between 17 August and 18 September, 1981, a UNIDO Consultant visited nine institutions to assess their capabilities in terms of their national status, and contributions, and also their potential as regional resources for industrial training and experience for trainees of countries with less adequate facilities. An important feature of this mission was the identification of areas where small inputs of technical assistance could strengthen and consolidate the contribution of an institution to the national programme of development as a primary function and secondly to induce recognition of the institution as a regional resource.

2. Special aims of the project

This project proposal forms part of a wider strategy devoted to the improvement of national industrial training facilities in the region and from which a network of centres of special standards and functions will emerge as resources for the region and, in some cases, with potential as a global resource.

3. Objectives

The long-term objective of this project is to ensure that the industrial growth in developing countries is soundly based on a well trained and organized labour force fully conversant with the techniques and technologies appropriate to their countries' national development programmes. This can be achieved through a programme of Technical Co-operation between Developing Countries, within which the University of Technology can make a contribution.

The immediate objective of the project is to improve the capability of the University of Technology so that it will better serve the interests of the Malaysian Economic Development Programme, and satisfy the aspirations of its trainees. These immediate aims will be achieved as indicated below.

(a) To assist in resolving the extremely complex problems associated with the development and utilization of the new University Campus being provided in Johore Bahru. To ensure that all resources required are available at the appropriate time so that students transferred to the new campus and those remaining in the existing campus in Jalan Gurney suffer the absolute minimum disruption or deterioration in their studies.

(b) To assist in the design and development of a research laboratory facility which will provide a consultancy and advisory service for industry and a pure and applied research resource for the University and students wishing to carry out post-graduate work related to industry. To help to establish this research laboratory as a recognized Faculty of the University, with its own Dean and technical staff, and to develop the working and academic relationships with other research laboratories in the University.

(c) To assist the recently formed Petroleum and Natural Gas Engineering Department in the Faculty of Mechanical Engineering to develop its industrial research laboratory and curriculum in accordance with the needs of the industry in Malaysia. To develop linkages with the industry and appropriate authorities so that the University can respond to new developments in the exploitation of the mineral oil and natural gas resources.

(d) To assist the Marine Engineering Department in the Faculty of Mechanical Engineering to develop its marine engineering research laboratory and its curriculum to meet the requirements of the appropriate national Maritime Boards in the certification process for sea-going engineers and other agencies involved in maritime activities.

(e) To provide assistance to all departments in the University in the general techniques of instruction and the application of training aids to enhance this process.

(f) To provide the opportunity of short study tours and exposure to industrial experience outside of Malaysia for an appropriate member from each of the departments associated with the inputs shown in (c) and (d) above.

The timing and extent of the above inputs, which were identified following several visits and discussions with senior academic staff, are programmed below.

PROJECT INPUTS

Post No.	Type of input	Total Man/months	Cost of man/months 1982			Cost of man/months 1983				US$ Total
			April/June	July/Sept	Oct/Dec	Jan/Mar	April/June	July/Sept	Oct/Dec	
1.	Expert in industrial organization and planning	18		6 months US$43,800			12 months US$94,000			138,600
2.	Expert in industrial research	12		8 months US$58,400		4 months US$31,600				90,000
3.	Expert in petroleum and natural gas engineering	6		6 months US$43,800						43,800
4.	Expert in marine engineering	6		6 months US$43,800						43,800
5.	Expert in training methodology	3			3 months US$21,900					21,900
6.	Fellowship associated with Post No. 3	3				3 months US$6,000				6,000
7.	Fellowship associated with Post No. 4	3				3 months US$6,000				6,000
	TOTALS		14,600	87,600	109,500	59,400	31,600	23,700	23,700	350,100

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

PROJECT PROPOSAL

Country:	Malaysia
Project No.:	
Scheduled start:	May 1982
Scheduled completion:	June 1983
Host Government Counterpart Agency:	Public Service Department/National Institute of Public Administration
Project title:	Assistance to develop the existing potential and enhance the capabilities of the National Institute of Public Administration as a national training resource. For public service.
UNIDO contribution:	US$190,750
Government contribution:	In kind
Proposal submitted by:	Robert Bell
Date of submission:	24 October 1981

1. Background and justification

It is acknowledged that the rapid advances being made in technology require continuous, organized and relevant, industrial training programmes to ensure that the labour force, both existing and new, shall have the competence essential for the full performance of their tasks. This is fundamental to industrial growth and is of equal importance in the provision of an efficient workforce in the public sector which must be dynamic in meeting and understanding the changing processes in the private sector.

The National Institute of Public Administration (INTAN), as a Division within the Public Service Department, is the official training agency for all public service personnel and fills the dual role of career development training and training of personnel for the expanding demands of the public sector. While INTAN is effectively meeting the demands made upon it through the wide variety of training courses it promotes nationally, and internationally for countries of the Asia and Pacific Region, it is recognized that some new training areas would benefit from technical inputs which would introduce newer technologies. These inputs would ensure that the full potential of INTAN as a national training resource was realized and the service already being provided for countries in the region would benefit.

2. Special aims of the project

This project proposal forms part of a wider strategy devoted to the improvement of national industrial training facilities in the region and from which a network of centres of special standards and functions will emerge as resources for the region and, in some cases, with potential as global resources.

3. Objectives

The long-term objective of this project is to ensure that the industrial growth in developing countries is soundly based on a well trained and organized labour force fully conversant with the techniques and technologies appropriate to their countries' national development programmes. This can be achieved through a programme of Technical Co-operation between Developing Countries, within which the National Institute of Public Administration can subscribe and receive.

The immediate objective of the project is to strengthen some of the training programmes offered by INTAN by giving emphasis to the industrial aspects of their content and ensure that they are related to the industrial developments taking place. Government service trainees will benefit directly from the improvements in the training programmes and these will be achieved by the following assistance programme.

(a) Assist in developing the production management training course content to include modern industrial management techniques, appropriate to the parts of production management activities that are relevant to departmental needs. As production management comprises many separate and identifiable activities, devise a modular training approach which will give a flexible approach and economy of effort.

(b) Assist existing staff to improve all training programmes by applied training methodology and develop the means of ensuring that new staff members recruited in the expansion programme have access to the latest training methodology.

(c) Assist in developing the curricula for training programmes in computer programming and operation. Ensure that the training programmes provide a supply of personnel conversant with the computer applications in government service and familiar with any data storage and retrieval systems which may be developed.

(d) Assist in developing the course content for training programmes in industrial manpower planning and establish relationships with the appropriate manpower planning departments within the government service to ensure that the training programmes embody the systems of information gathering, collation and analysis that are currently employed.

(e) Provide the opportunity of a short study tour for two department members associated with the technical input in (c) above. These study tours could be possibly arranged for convenience and economy at the National Productivity Board, Singapore.

The technical co-operation outlined above was specified during discussions with senior staff members of INTAN and the timing and extent of the inputs are charted below.

PROJECT INPUTS

Post No.	Type of input	Total Man/months	Cost of man/months 1982			Cost of man/months 1983				US$ Total
			April/June	July/Sept	Oct/Dec	Jan/March	April/June	July/Sept	Oct/Dec	
1.	Expert in industrial production management	6		6 months US$43,800						43,800
2.	Expert in training methodology	6		6 months US$43,800						43,800
3.	Expert in industrial computer applications	6	2 US$14,600	3 21,900	1 7,300					43,800
4.	Expert in industrial manpower planning	6		6 months US$43,800						43,800
5.	Fellowship in computer applications	4			3 US$5,550	1 2,000				7,550
6.	Fellowship in computer applications	4				1 US$2,000	3 6,000			8,000
	TOTALS		14,600	87,600	78,550	4,000	6,000			190,750

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

PROJECT PROPOSAL

Country:	Malaysia
Project No.:	
Scheduled start:	July 1982
Scheduled completion:	June 1983
Host Government Counterpart Agency:	Ministry of Primary Industries/Palm Oil Research Institute of Malaysia
Project title:	Development of the Training Function
UNIDO contribution:	US$96,750
Government contribution:	
Proposal submitted by:	Robert Bell
Date of submission:	24 October 1981

1. Background and justification

Malaysia is the word's largest producer and exporter of palm oil and the Palm Oil Research Institute of Malaysia (PORIM) conducts a programme of technological research and development aimed at ensuring that this position is maintained. The research ranges from plant breeding for improved growing and harvesting characteristics through to improvement in quality and stability in the purity of the finished product.

An integral part of the important role played by PORIM in the Malaysian economy is the provision of technical advisory services and the collation and dissemination of information to consumers to stimulate market development. It is equally vital that research leading to new and better methods within the industry, should be made available to the vast number of people it employs, through a process which they will readily understand. A well-organized training department will play an active part in satisfying the previous requirements and, equally important, it will subscribe to the staff development programme so essential to meet the growth envisaged in the future.

It was acknowledged during discussions with senior personnel in PORIM that training was an important function in the Institute's activities and provision had been made for the appointment of a Training Officer to the establishment. Support to the development of training within PORIM is regarded as an important contribution to be made through technical assistance.

2. Special aims of the project

This project proposal forms part of a wider strategy devoted to the improvement of national industrial training facilities in the region and from which a network of centres of special standards and functions will emerge as resources for the region and, in some cases, with potential as global resources.

3. Objectives

The long-term objective of this project is to ensure that industrial growth in developing countries is soundly based on a well-trained and organized labour force fully conversant with the techniques and technologies appropriate to their countries' national development programmes. This can be achieved through a programme of Technical Co-operation between Developing Countries, within which the Palm Oil Research Institute of Malaysia can participate.

The immediate objective of this project is to assist PORIM to develop the training function and through this improve the effectiveness of those employed in the industry, and impart information relevant to consumers. These benefits can be realized through the following technical assistance programme.

(a) Assist in the training and development of the person appointed responsible for the training function, determine the types of training programmes required and develop and implement these using the most suitable training methodology;

(b) Provide one study tour for the person appointed in (a) above to give exposure to modern training methods.

The implementation of the above programme is shown below.

PROJECT INPUTS

Post No.	Type of input	Total Man/months	Cost of man/months 1982			Cost of man/months 1983				US$ Total
			April/June	July/Sept	Oct/Dec	Jan/March	April/June	July/Sept	Oct/Dec	
1.	Expert in training methodology	12		6 months US$43,800		6 months US$47,400				91,200
2.	Fellowship in training methodology	3			3 US$5,550					5,550
	Totals			21,900	27,450	23,700	23,700			96,750

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

PROJECT PROPOSAL

Country:	Malaysia
Project No.:	
Scheduled start:	July 1982
Scheduled completion:	September 1982
Host Government Counterpart Agency:	Malaysian Institute of Management
Project title:	Improvement of Training Methods
UNIDO contribution:	US$31,900
Government contribution:	
Proposal submitted by:	Robert Bell
Date of submission:	24 October 1981

1. Background and justification

It is of paramount importance that management in the industrial, manufacturing and commercial sectors in private enterprise shall have access to the latest technological information and techniques of management. This vital role is filled in Malaysia through the activities of the Malaysian Institute of Management and the very comprehensive range of training programmes that it offers.

The MIM has shown a remarkable capacity for recovery following the complete loss of materials and equipment, by fire, on two separate occasions in the past five years. New developments and expansion programmes will soon give MIM independence in office accommodation and lecture-room facilities. There is a planned increase of the training staff taking place and it is important that they, and the existing training staff, should receive training which will ultimately result in benefit to the training course participants.

2. Special aims of the project

This project forms part of a wider strategy devoted to the improvement of national industrial training facilities in the region and from which a network of centres of special standards and functions will emerge as resources for the region and, in some cases, with potential as global resources.

3. Objectives

The long-term objective of this project is to ensure that the industrial growth in developing countries is soundly based on a well-trained and organized labour force fully conversant with the technqiues and technologies appropriate to their countries' national development programmes. This can be achieved through a programme of Technical Co-operation between Developing Countries, within which the Malaysian Institute of Management may eventually play its part.

The immediate objective of the project is to bring new training methods to the existing training programmes, to enhance their effectiveness and benefit the large number of trainees from the private sector. An improvement in course presentation should reflect in more efficient management in the private sector and an increase in viability in the enterprise. The multiplier effect which can be achieved will be realized from the small technical input outlined below.

(a) Assist in examining and improving the training techniques applied to the training courses offered to private sector trainees and develop training packages for use in the in-company training programmes;

(b) Provide training equipment to support the new training techniques and utilize this to enhance the training programmes.

The timing of the above inputs are given on the attached chart.

PROJECT INPUTS

Post No.	Type of input	Total Man/months	Cost of man/months 1982			Cost of man/months 1983				US$ Total
			April/June	July/Sept	Oct/Dec	Jan/March	April/June	July/Sept	Oct/Dec	
1.	Expert in training methodology	3		3 21,900						21,900
	Training equipment to be specified by the expert in post				US$10,000					10,000
		Totals		21,900	10,000					31,900

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

PROJECT PROPOSAL

Country:	Malaysia
Project No.:	
Scheduled start:	October 1982
Scheduled completion:	September 1983
Host Government Counterpart Agency:	Ministry of Trade and Industry/National Productivity Centre
Project title:	Assistance to strengthen parts of the training programme.
UNIDO contribution:	US$116,700
Government contribution:	In kind
Proposal submitted by:	Robert Bell
Date of submission:	24 October 1981

1. Background and justification

Managerial development must be a continuous process in an industrial sector which is expanding and adapting to new technologies. The provision of a range of training courses, suited to the on-going and the changing needs of industry, is fundamental to the managerial growth that is essential to maintain the dynamic situation in industry.

The National Productivity Centre makes a considerable contribution in the field of management development, through a regular programme of training courses covering every aspect of management. Past records show that the training courses receive considerable support and during 1980 a total of 436 courses attracted 9,337 participants. This makes it imperative that the contents of the training courses should be relevant to the needs of industry and delivered in a manner that maximum retention will result. Discussions with the Deputy Director (Training), and observations made, indicate that a small technical co-operation programme would strengthen the industrial management sector of the training programmes and also contribute to the training staff development programme.

2. Special aims of the project

This project proposal forms part of a wider strategy devoted to the improvement of national industrial training facilities in the region and from which a network of centres of special standards and functions will emerge as resources for the region and, in some cases, with potential as global resources.

3. Objectives

The long-term objective of this project is to ensure that the industrial growth in developing countries is soundly based on a well trained and organized labour force fully conversant with the techniques and technologies appropriate to their countries' national development programmes. This can be achieved through a programme of Technical Co-operation between Developing Countries, within which the National Productivity Centre can subscribe and receive.

The immediate objective of the project is to strengthen the industrial production management training programme and ensure that the techniques contained in the course will be suitable for application within Malaysian

industry. The project will also be directed towards the staff development programme which will arise out of the expansion plans being implemented. In particular it will aim at providing the training staff with techniques to improve the overall training capacity. These objectives will be achieved as follows:

(a) Assist in developing the industrial production management course content to include modern management techniques which are suitable for application in the industrial sector. As production management consists of many separate and identifiable activities devise a modular training system which gives a flexible approach and economy of training effort;

(b) Assist existing staff to improve all training programmes by applied training methodology and develop the means of ensuring that new staff members have access to the latest training techniques.

The timing of these inputs are shown on the attached chart.

PROJECT INPUTS

Post No.	Type of input	Total Man/months	Cost of man/months 1982 April/June	July/Sept	Oct/Dec	Cost of man/months 1983 Jan/March	April/June	July/Sept	Oct/Dec	US$ Total
1.	Expert in industrial production management	12			3 US$21,900		9 US$71,100			93,000
2.	Expert in training methodology	3				3 US$23,700				23,700
		TOTALS			21,900	47,400	23,700	23,700		116,700

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

PROJECT PROPOSAL

Country:	Malaysia
Project No.:	
Scheduled start:	October 1982
Scheduled completion:	December 1983
Host Government Counterpart Agency:	Ministry for Primary Industries/Rubber Research Institute of Malaysia
Project title:	Develop the training facilities through the introduction of small scale pilot plant.
UNIDO contribution:	US$152,400
Government contribution:	US$2,804,850
Proposal submitted by:	Robert Bell
Date of submission:	24 October 1981

1. Background and justification

Malaysia holds a leading role in rubber production, technology and research throughout the world and this can largely be attributed to the work of the Malaysia Rubber Research and Development Board and its supporting infrastructure. In particular, the Rubber Research Institute of Malaysia makes a substantial contribution to the position held by Malaysia and the training activity within R.R.I.M. ensures, through the quality of its training programmes, that this position is maintained.

It is planned, during the present decade, to increase rubber production from its present 1.6 million tonnes to 3.3 million tonnes by 1990 and expand rubber manufacture from 60,000 tonnes to 300,000 tonnes. To meet such targets a comprehensive training and development programme is essential, particularly with regard to the smallholder sector and the processes related to Ribbed Smoked Sheet (R.S.S.). Rubber-based Product Manufacturing employs over 20,000 people, mainly in small-scale production units, and the projected growth rate will increase this figure to over 30,000 by 1990. As small-scale industries in rubber manufacturing do not have the capability to provide training, their needs must be met by the resources of the training section of R.R.I.M.

Aware of the demands that will be made upon them by the growth targets in the rubber production and manufacturing activities, the Head of Training Personnel and Staff Development Division, along with the Group Training Officer and technical staff of R.R.I.M. prepared proposals designed to bring considerable improvement to the training function. These proposals were the subject of discussion with the UNIDO Consultant and feature in the report (RP/RAS/81/001/11-02/31-5A). Copies of the proposals are available from the Head of the Training, Personnel and Staff Development Division and this project is designed to be an integral part of the proposals.

2. Special aims of the project

This project forms part of a wider strategy devoted to the improvement of national industrial training facilities in the region and from which a network of centres of special standards and functions will emerge as resources for the region and, in some cases, with potential as global resources.

3. Objectives

The long-term objective of this project is to ensure that the industrial growth in developing countries is soundly based on a well trained and organized labour force fully conversant with the techniques and technologies appropriate to their countries' national development programmes. This can be achieved through a programme of Technical Co-operation between Developing Countries, within which the Rubber Research Institute of Malaysia can subscribe and receive.

The immediate objective of the project is to improve the training facilities available within R.R.I.M. so that the production expansion targets of the industry may be achieved without a loss of efficiency and quality. Improved training resources will bring benefit to the many employees in the industry and assist them to develop with the industry. To a considerable extent, the viability of the industry rests upon the efficiency of the great number of employees engaged in small enterprises and the improved training resources will improve their contribution. The training facility will be improved with the following inputs:

(a) Assist in the design, layout and utilization of pilot plants as training resources and co-operate in the development of the training programmes associated with them;

(b) Assist in applying training methodology to the training courses in general and to the new training programmes emerging from input (a) in particular;

(c) Arrange for two study tours to reinforce the inputs of (a) and (b) by exposure to industrial applications of the training techniques.

The details of the above inputs along with those contained in the training improvement proposals prepared in R.R.I.M. are attached.

PROJECT INPUTS

Post No.	Type of input	Total Man/months	Cost of man/months 1982 April/June	Cost of man/months 1982 July/Sept	Cost of man/months 1982 Oct/Dec	Cost of man/months 1983 Jan/March	Cost of man/months 1983 April/June	Cost of man/months 1983 July/Sept	Cost of man/months 1983 Oct/Dec	US$ Total
1.	Expert in rubber or chemical process technology	12			21,900	12 23,700	23,700	23,700		93,000
2.	Expert in training methodology	6					6 23,700	23,700		47,400
3.	Fellowship associated with post No. 1	3							3 6,000	6,000
4.	Fellowship associated with post No. 2	3							3 6,000	6,000
		TOTALS			21,900	23,700	47,400	47,400	12,000	152,400

R.R.I.M. CAPITAL ASSETS INPUTS

Proposal No.	Title of courses developed	1982	1983				US$ cost
		Oct/Dec	Jan/March	April/June	July/Sept	Oct/Dec	
1.	Ribbed smoked sheet production course pilot plant equipment		Design and Procure				
		3,200	40,000	40,000			83,200
2.	Rubber based product manufacturing technology course						
	(a) Laboratory building		Design and Construct				
		20,000	140,000	140,000			300,000
	(b) Laboratory plant and equipment		Procure				
			1,000,000	1,156,250			2,156,250
3.	Improvement of existing facilities						
	(a) N.R. Processing School Laboratory, Library, Hostel Bungalow		Design and Construct				
		16,500	100,000	100,000			216,500
	(b) N.R. training course. Extension of accommodation and supply of furnishings		Construct				
			20,000	28,900			48,900
	TOTALS	39,700	1,300,000	1,465,150			2,804,850

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

PROJECT PROPOSAL

Country:	Malaysia
Project No.:	DP/MAL/80/001 Revision No. 1
Scheduled start:	July 1982
Scheduled completion:	September 1983 (or later according to 50 Fellowship Programme)
Host Government Counterpart Agency:	Ministry of Science, Technology and Environment/Standards and Industrial Research Institute of Malaysia
Project title:	To Assist in the Development of the Industrial Training Function.
UNIDO contribution:	Revision total: US$147,200 New project total: US$412,200
Government contribution:	In kind
Proposal submitted by:	Robert Bell
Date of submission:	24 October 1981

1. Background and justification

SIRIM is currently implementing an expansion programme to increase and improve the facilities available to aid the development of industrial production and guide industry in the application of new technologies. In general, industry does not have the time, capital and research experience to pursue new technologies or practices leading to improved productivity and higher quality. It is incumbent upon institutes such as SIRIM to monitor technological developments and assess their viability within the national development programme.

The benefits of the research carried out by SIRIM and the technical information gathered through its international linkages should be available to the industrial sector and this can best be achieved through the medium of a well-organized training programme. The post of Training Officer is due to be filled in the near future and the establishment of this function is regarded as vitally important to the overall effectiveness of SIRIM's work. In addition to creating training links with industry it is of value to establish a staff training and development function within SIRIM so that the expansion programme and replacements required through natural wastage should be fully equipped for their duties.

2. Special aims of the project

This project forms part of a wider strategy devoted to the improvement of national industrial training facilities in the region and from which a network of centres of special standards and functions will emerge as resources for the region and, in some cases, with potential as global resources.

3. Objectives

The long-term objective of this project is to ensure that the industrial growth in developing countries is soundly based on a well trained and organized labour force fully conversant with the techniques and technologies appropriate to their countries' national development programmes. This can be achieved through a programme of Technical Co-operation between Developing Countries within which the Standards and Industrial Research Institute of Malaysia can subscribe and receive.

The immediate objective of this project is to develop the training function and create industrial linkages for the two-directional interchange of information. The project seeks also to build up the research consultancy/advisory

services of SIRIM through the linkages created by the training activity so that the training service is aware of industrial needs and can make provision for them. These aims will be achieved with a minor revision of the existing project as follows:

(a) Assist in developing the training activity through the preparation of training courses and presenting these to the industrial sector with the most appropriate training methods. Assist the Training Officer to establish a system of linkages with industry for the two-way flow of information and develop a basis of determining industrial training needs that can be satisfied within SIRIM programmes;

(b) Provide a study tour for the appropriate person associated with input (a) so that an appreciation of training activities, problems and solutions can be gained.

The inputs suggested are listed on the attached sheet.

PROJECT INPUTS

Post No.	Type of input	Total Man/months	Cost of Man/months 1982			Cost of Man/months 1983				US$ Total
			April/June	July/Sept	Oct/Dec	Jan/March	April/June	July/Sept	Oct/Dec	
1.	Expert in training techniques and curriculum development	12		3 21,900	3 21,900	3 23,700	3 23,700			91,200
2.	Fellowship for the person associated with Post No. 1	3						3 6,000		6,000
3.	Training equipment to be specified by Post No. 1 and Post No. 2				10,000	20,000	20,000			50,000
		Revision totals		21,900	31,900	43,700	43,700	6,000		147,200
	Current project total for 50 Fellowships									265,000
								New revised total		412,200

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

PROJECT PROPOSAL

Country:	Malaysia
Project No.:	
Scheduled start:	
Scheduled completion:	
Host Government Counterpart Agency:	MARA
Project title:	Strengthening of the Entrepreneur Development Training Programmes with Motivation Factors.
UNIDO contribution:	
Government contribution:	
Proposal submitted by:	Robert Bell
Date of submission:	24 October 1981

1. Background and justification

The MARA entrepreneur development programme makes an important contribution to the social structure in Malaysia through its aims of providing equality of opportunity for the Malay ethnic group. The programme currently has interest in some 30,000 entrepreneurs and supports their activities in a variety of ways.

The main core of the development programme is, however, the modular training course for prospective entrepreneurs and the identification of suitable participants. Each entrepreneur aspirant entering the training programme represents a considerable investment in the process of developing his potential and it is important that assessments prior to, and during, training should be soundly based. It is of importance also that the course participants should be stimulated and motivated during training so that their full potential is realized. These assets can be achieved by applying the technique of Behavioural Sciences to aspects of selection and the modular training programme.

2. Special aims of the project

To ensure that the investment in entrepreneurs gives the maximum benefit return to the national economy and satisfies the aspirations of those involved.

3. Objectives

The long-term objective of this project is to ensure that equality of opportunity results in a social and economic balance between the ethnic groups comprising the Malyasian population.

The immediate objectives are to ensure that those most suitable enjoy the benefits available and have the capacity to capitalize on the support given. Where appropriate, introduce motivation factors to the modular training programme and to the extension activities of counselling and consultancy. These objectives will be achieved with a small input of technical co-operation, as follows:

(a) Assist those concerned with the entrepreneur development programme activities of training, consultancy and advisory services to apply behavioural sciences techniques to their work with the emphasis on motivation factors.

This input is shown on the attached chart.

PROJECT INPUTS

Post No.	Type of input	Total Man/months	Cost of Man/months 1982			Cost of Man/months 1983				US$ Total
			April/June	July/Sept	Oct/Dec	Jan/March	April/June	July/Sept	Oct/Dec	
1.	Expert in entrepreneur development programmes with experience in behavioural sciences	6		6 21,900	21,900					43,800
		TOTALS		21,900	21,900					43,800

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

PROJECT PROPOSAL

Country:	Singapore
Project No.:	
Scheduled start:	July 1982
Scheduled completion:	December 1983
Host Government Counterpart Agency:	Ministry of Education/Ngee Ann Technical College
Project title:	Assist in developing technician diploma courses giving emphasis to the practical aspects for high technology in industry.
UNIDO contribution	US$229,800
Government contribution:	In kind
Proposal submitted by:	Robert Bell
Date of submission:	24 October 1981

1. Background and justification

The declared national policy in Singapore during the present decade is aimed at restructuring the economy by developing high technology, high value added processes in industry. This will create a demand for technicians of good academic standing, reinforced by sound practical ability. Ngee Ann Technical College senior staff are acutely aware of the changing requirements of industry, both qualitatively and quantitatively, and a fine development plan to expand the College facilities is in the process of implementation.

A focal point in the development plans is the improvement and updating of the workshops and laboratories equipment to more accurately simulate industrial conditions. This is regarded as imperative following the release of the results of a survey of industry on 3 October 1981, which indicated quite firmly that the Technician Diploma graduates of the College, and Singapore Polytechnic, while well qualified academically were below the standard expected in industry in the practical application of the theory. This extensive survey, carried out by the Economic Research Centre of the National University of Singapore, reinforced the opinions of the Principal and Heads of Departments that emphasis should be given to the workshop and laboratories activities and the integration of these into the theoretical work.

The student population is expected to double, to 7,000 in the next six years and it is vital that this growth should be equipped to enter industry about the end of the decade. This suggests that considerations being given to course content now should take account of new developments being planned, such as expansion of petroleum refining and exploitation of the down-stream derivatives.

2. Special aims of the project

This project forms part of a wider strategy devoted to the improvement of national industrial training facilities in the region and from which a network of centres of special standards and functions will emerge as resources for the region and, in some cases, with potential as global resources.

3. Objectives

The long-term objective of this project is to ensure that the industrial growth in developing countries is soundly based on a well trained and organized labour force fully conversant with the techniques

and technologies appropriate to their countries' national development programmes. This can be achieved through a programme of Technical Co-operation between Developing Countries within which the Ngee Ann Technical College can subscribe and receive.

The immediate objective of this project is to develop the industrial practical aspects of the Technician Diploma Courses by determining the workshops and laboratories contribution and integrating this at appropriate points in the academic work. Ensure that these developments will satisfy the needs of industry in terms of the known and planned technological advances and that the product of the College will be fully equipped to meet the demands made by industry.

These objectives will be achieved through a technical co-operation programme outlined below:

(a) Assist in restructuring the options in the final year of the electronics course when the present electrical and electronic engineering course becomes two separate courses of study. Identify the industrial applications to be demonstrated in the workshops and laboratories in both the new electronic and electrical engineering courses and assist in integrating these into the two courses to give balance to both courses after the division;

(b) Assist in devising instrument control loops and cascade systems with both pneumatic and hydraulic actuators as utilized in capital intensive industry and structure these as an integral part of the engineering course. Determine the need for other laboratory equipment giving practical applications of fluid flow and pressure drop;

(c) Arrange a study tour for the Department of Business Studies to give exposure to the industrial applications of modern management techniques such as Industrial/Human Relations, Industrial Democracy, Group Dynamics, Behavioural Sciences and Motivation Techniques;

(d) Arrange a study tour for the Department of Building to examine the use of modular training techniques and their application to part-time courses for those already employed and wishing to achieve some personal development;

(e) Arrange a study tour for the Department of Building to study the management of high rise buildings and the techniques for maintenance of the services within them. Also to study the hazards associated with high rise buildings and the actions taken to eliminate these;

(f) Arrange an extended study tour for the Department of Building for a post graduate study of Plumbing/Sanitary Engineering in preparation for introducing this course of study in 1984.

These technical inputs are charted on the following page.

PROJECT INPUTS

Post No.	Type of input	Total Man/months	Cost of man/months 1982			Cost of man/months 1983				US$ Total
			April/June	July/Sept	Oct/Dec	Jan/March	April/June	July/Sept	Oct/Dec	
1.	Expert in electronics and electrical control systems	12		3 21,900	3 21,900	3 23,700	3 23,700			91,200
2.	Expert in mechanical engineering instrument control loops	12		3 21,900	3 21,900	3 23,700	3 23,700			91,200
3.	Fellowship in behavioural sciences and other techniques of management/worker relations	4				1 2,000	3 6,000			8,000
4.	Fellowship in modular training techniques in building courses	4				1 2,000	3 6,000			8,000
5.	Fellowship in high rise building management and maintenance	4		1 1,850	3 5,550					7,400
6.	Fellowship in plumbing/sanitary engineering	12				3 6,000	3 6,000	3 6,000	3 6,000	24,000
	TOTALS			45,650	49,350	57,400	65,400	6,000	6,000	229,800

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

PROJECT PROPOSAL

Country:	Singapore
Project No.:	
Scheduled start:	July 1982
Scheduled completion:	June 1983
Host Government Counterpart Agency:	Ministry of Education/ Singapore Polytechnic
Project title:	Assist in developing technician diploma courses giving emphasis to the practical aspects for high technology in industry.
UNIDO contribution:	US$273,600
Government contribution:	In kind
Proposal submitted by:	Robert Bell
Date of submission:	24 October 1981

1. Background and justification

Singapore Polytechnic in common with its counterpart, the Ngee Ann Technical College, has embarked on an expansion and development plan designed to double the throughput of students, with a commensurate doubling of the staff strength, by 1986. Embodied in this plan is a restructuring of the Technician Diploma courses to give emphasis to the practical aspects of the courses and this will be achieved in the extended workshop/laboratory facilities equipped to accommodate the advance into high technology outlined in the national economic policy.

Discussions with the Deputy Vice-Principal and Heads of Departments showed that they were very conscious of the demands to be made on them in the next five years. In particular the shortage of suitable staff poses a problem in the expansion plans and support with the restructuring of the courses will be necessary while the parallel training of the newly appointed staff takes place.

An extensive industrial survey conducted by the Economic Research Centre of the National University of Singapore, and released on 3 October 1981, firmly underlined the need to reinforce the practical aspects of the Diploma courses and the staff of the Polytechnic recognize that this should be afforded some priority. It is important that the changes to take place in the next five years should take account of industrial development forecasts and liaison with industry for this purpose is fundamental.

2. Special aims of the project

This project forms part of a wider strategy devoted to the improvement of national industrial training facilities in the region and from which a network of centres of special standards and functions will emerge as resources for the region and, in some cases, with potential as global resources.

3. Objectives

The long-term objective of this project is to ensure that the industrial growth in developing countries is soundly based on a well trained and organized labour force fully conversant with the techniques and technologies appropriate to their countries' national development programmes. This can be achieved through a programme of Technical Co-operation between Developing Countries within which the Singapore Polytechnic can subscribe and receive.

The immediate objective of this project is to develop the industrial practical aspects of the Technician Diploma courses by determining the workshops and laboratories contribution and integrating this at appropriate points in the academic work. Also to ensure that these developments will satisfy the needs of industry in terms of the known and planned technological advances and that the product of the Polytechnic will be fully equipped to meet the demands made by industry.

These objectives will be achieved through a technical co-operation programme outlined below:

(a) Assist in developing the Marine Engineering workshops and laboratories to demonstrate the modern practice of computerized engine room control systems along with the ancillary equipment such as pumps, heat exchangers, de-salination equipment, hydraulic control systems;

(b) Assist in developing the workshops and laboratories to demonstrate computerized deck control systems and navigational aids such as the Automatic Relative Plotting Aid, knowledge of which is a pre-requisite for Mate and Master tickets awarded by the Maritime Boards;

(c) Assist in developing the industrial chemical process laboratory and workshops to familiarize students with process control systems as applied to distillation, both random packed and bubble tray columns, absorption and matter separation equipment. Develop control loops for pressure, level, flow and temperature and link these through cascade systems.

These technical inputs are shown on the attached chart.

PROJECT INPUTS

Post No.	Type of input	Total Man/months	Cost of man/months 1982			Cost of man/months 1983				US$ Total
			April/June	July/Sept	Oct/Dec	Jan/March	April/June	July/Sept	Oct/Dec	
1.	Expert in modern marine engine room equipment	12		3 21,900	3 21,900	3 23,700	3 23,700			91,200
2.	Expert in electronic navigation aids	12		3 21,900	3 21,900	3 23,700	3 23,700			91,200
3.	Expert in industrial chemical process control	12		3 21,900	3 21,900	3 23,700	3 23,700			91,200
	TOTALS			65,700	65,700	71,100	71,100			273,600

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

PROJECT PROPOSAL

Country:	Singapore
Project No.:	
Scheduled start:	July 1982
Scheduled completion:	September 1983
Host Government Counterpart Agency:	Singapore Institute of Standards and Industrial Research
Project title:	Determine the requirements and assist in the development of a materials technology and applications centre.
UNIDO contribution:	US$138,600
Government contribution:	In kind
Proposal submitted by:	Robert Bell
Date of submission:	24 October 1981

1. Background and justification

With the declared national policy being directed towards industry moving into high technology and capital intensive activities, it is important that an institute such as the SISIR should have the capability to research, explore and exploit new techniques and discoveries. The institute is already very well equipped in its various departments and makes a considerable contribution to industrial progress through its research and consultancy service and also through a range of training programmes available to industry.

Capital intensive industry has a high dependence on materials and equipment and knowledge of their limits and applications are fundamental to the design, construction and operation of modern plant. New materials and sophisticated equipment are being introduced with increasing frequency and the demands for improved reliability are also increasing because failures in capital intensive industry can be very costly in terms of output losses and safety aspects.

The plans for SISIR to develop a laboratory for research and development in the field of Materials Technology and Applications are soundly based in view of the national policy. The range of equipment required and the activities of this Centre must be related to the planned industrial development so that the centre can provide a service to industry through its research programme, which can be reinforced by a training activity.

2. Special aims of the project

This project forms part of a wider strategy devoted to the improvement of national industrial training facilities in the region and from which a network of centres of special standards and functions will emerge as resources for the region and, in some cases, with potential as global resources.

3. Objectives

The long-term objective of this project is to ensure that the industrial growth in developing countries is soundly based on a well trained and organized labour force, fully conversant with the techniques

and technologies appropriate to their countries' national development programmes. This can be achieved through a programme of technical co-operation between developing countries within which the Singapore Institute of Standards and Industrial Research can subscribe and receive.

The immediate objective of the project is to develop the capability of the institute to carry out a programme of research and development in a centre for Materials Technology and Applications that will stimulate and support the industrial advancement being sought in the national programme. Also to establish links both with industry locally and internationally recognized research organizations so that the industrial sector in Singapore will benefit rapidly from any new developments related to their fields of endeavour.

These objectives will be achieved through a technical co-operation programme outlined below:

(a) Assist in establishing the scope of activities and hence the physical requirements of a Materials Technology and Applications Centre that will provide a service to industry and aid the progress desired in the national policy for industrial development;

(b) Support the effectiveness of the Centre by developing the training capability to ensure that industry is rapidly acquainted with new developments and is given the knowledge to exploit them.

These areas of co-operation are shown on the attached chart.

PROJECT INPUTS

Post No.	Type of Input	Total Man/Months	Cost of Man Months 1982			Cost of Man Months 1983				US$ TOTAL
			April/June	July/Sept	Oct/Dec	Jan/March	April/June	July/Sept	Oct/Dec	
1.	Expert in materials technology and applications	12		3	3	3	3			
				21,900	21,900	23,700	23,700			91,200
2.	Expert in training metho-dology	6					3	3		
							23,700	23,700		47,400
		TOTALS		21,900	21,900	23,700	47,400	23,700		138,600

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

PROJECT PROPOSAL

Country:	Singapore
Project No.:	
Scheduled start:	January 1982
Scheduled completion:	September 1982
Host Government Counterpart Agency:	Singapore Institute of Management
Project title:	Improvement of the industrial training activity
UNIDO contribution:	US$29,200
Government contribution:	In kind
Proposal submitted by:	Robert Bell
Date of submission:	24 October 1981

1. Background and justification

The Singapore Institute of Management (SIM) is making a considerable contribution to the improvement of the management function, in the industrial and commercial sectors of Singapore, through a wide variety of training programmes. As an organization SIM is self-sufficient through the support it receives from industry participating in its training courses and from membership fees, which devolve benefit upon the members.

If industry is developing and expanding, its management structure must be dynamic and receptive to change to stimulate and maintain the growth. This in turn demands the availability of a regular programme of training to equip newcomers to industry, and develop the potential of those already in industry, so that sound management techniques are available at all levels in the enterprises.

SIM has strong regional connections that can provide a source of information which can be integrated into the training programmes to keep Singaporean management aware of developments elsewhere. Any strengthening of the industrial management training activity will speed the process of industrial development and should, therefore, receive the fullest possible support.

2. Special aims of the project

This project forms part of a wider strategy devoted to the improvement of national industrial training facilities in the region and from which a network of centres of special standards and functions will emerge as resources for the region and, in some cases, with potential as global resources.

3. Objectives

The long-term objective of this project is to ensure that the industrial growth in developing countries is soundly based on a well trained and organized labour force fully conversant with the techniques and technologies appropriate to their countries' national development programmes. This can be achieved through a programme of Technical Co-operation between Developing Countries, within which the Singapore Institute of Management can subscribe and receive.

The immediate objective of the project is to bring new training techniques into the existing training programmes to enhance their effectiveness and benefit the large number of trainees from the private sector.

An improvement in course presentation should reflect in improvement in the application of management in industry to the ultimate benefit of the enterprise.

A small technical co-operation input should achieve these objectives:

(a) Assist in developing the training aids and techniques in the existing training programmes and so improve the effectiveness of these for the participants.

(b) Assist in the organization and implementation of a regional workshop being hosted by SIM on behalf of the Asian Association of Management Organizations in February 1982, for two weeks.

These inputs are shown on the attached chart.

PROJECT INPUTS

Post No.	Type of input	Total man/months	Cost of man/months 1982			Cost of man/months 1983				US$ Total
			April/June	July/Sept	Oct/Dec	Jan/March	April/June	July/Sept	Oct/Dec	
1.	Expert in training aids and training techniques	3		3 21,900						21,900
2.	Assistance in organization and implementation of regional workshop on industrial management	1	1 month Jan/Feb 1982 7,300							7,300
	TOTALS		Jan/Feb 7,300	21,900						29,200

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

PROJECT PROPOSAL

Country:	Singapore
Project No.:	
Scheduled start:	July 1982
Scheduled completion:	June 1983
Host Government Counterpart Agency:	National Productivity Board
Project title:	Assistance to strengthen parts of the industrial training programme.
UNIDO contribution:	US$156,900
Government contribution:	In kind
Proposal submitted by:	Robert Bell
Date of submission:	24 October 1981

1. Background and justification

The objectives of the National Productivity Board are directed towards the improvement of productivity in industry, and this is largely achieved through the wide range of training programmes available to management and supervision. The emphasis being given in the national policy to enter into the high technology industry and develop capital intensive plants brings with it the need for a continuous management training programme which will equip management to meet new demands. In this respect the NPB has a vital role to play and new technical areas will become the subject matter of training courses for the future.

The recently formed Industrial Engineering and Automation Department will become the focal point for training courses on the new technologies being introduced into industry and considerable effort will be required to prepare these courses and ensure that they are always relevant. With energy costs so high this department will also have an active role in the development of a series of courses on energy conservation. A further demand on this new department can be foreseen in the development of computerized production control systems designed to achieve maximum machine utilization.

The Industrial Engineering and Automation Department will be required to develop many training courses in parallel and at the same time carry out an effective consultancy/advisory service, thus creating a large initial workload.

2. Special aims of the project

This project forms part of a wider strategy devoted to the improvement of national industrial training facilities in the region and from which a network of centres of special standards and functions will emerge as resources for the region and, in some cases, with potential as global resources.

3. Objectives

The long-term objective of this project is to ensure that the industrial growth in developing countries is soundly based on a well trained and organized labour force fully conversant with the techniques and technologies appropriate to their countries' national development programmes. This can be achieved through a programme of Technical Co-operation between Developing Countries within which the National Productivity Board can subscribe and receive.

The immediate objective of the project is to assist the newly formed Industrial Engineering and Automation Department and the Supervisory Development Department in the design of training programmes required by industry in the interests of higher productivity. Devise a modular training approach which will contain modules relevant to industrial activity and arrange for the implementation of these in a way which will achieve the objective as rapidly and economically as possible.

This objective can be achieved by the following inputs:

(a) Assist in identifying applications of industrial robots and develop training programmes related to these, and the ancillary associated equipment, with regard to the productivity improvements that can be achieved and the cost/benefit returns on the capital investment;

(b) Assist in developing a training programme on all aspects of energy conservation in industry;

(c) Assist in improving the existing Instructor Training programme and ensure that its content is relevant for the industrial instructors/ trainers participating.

The duration and timing of the above inputs are shown on the attached chart.

PROJECT INPUTS

Post No.	Type of input	Total man/months	Cost of man/months 1982			Cost of man/months 1983				US$ Total
			April/June	July/Sept	Oct/Dec	Jan/March	April/June	July/Sept	Oct/Dec	
1.	Expert in industrial engineering	12		3 21,900	3 21,900	3 23,700	3 23,700			91,200
2.	Expert in energy conservation	6		3 21,900	3 21,900					43,800
3.	Expert in instructor training	3			3 21,900					21,900
	TOTALS			43,800	65,700	23,700	23,700			156,900

Annex I

VISITS MADE AND PERSONS WITH WHOM DISCUSSIONS WERE HELD

1. UNDP Kuala Lumpur - Regional Office for Malaysia and Singapore

1.1. Mr. Kouros Satrap, Regional Representative

1.2. Mr. Peter Luttik, JPO/UNIDO

2. Economic Planning Unit

2.1. Encik Abdul Razak bin Haji Ramli

3. University of Technology Malaysia

3.1. Datuk Abdul Aziz, Deputy Vice Chancellor

Faculty of Civil Eng.

3.2. Assoc. Prof. Ishak bin Abdul Rahman, Dean

Faculty of Mech. Eng.

3.3. Encik Abu Bakar bin Abdul Hamid, Dean

3.3.1. Encik Aziz Hassan, Deputy Dean

3.3.2. Encik Azlir Darisun, Head of Department, Thermofluids

3.3.3. Encik Abdul Ghani Mohammad, Head of Department, Mechanics and Design

3.3.4. Encik Syed Famy Syed Mansor, Head of Department, Petroleum and Natural Gas

Faculty of Science

3.4. Encik Mohd. Hussain bin Ibrahim, Deputy Dean

Faculty of Elect. Eng.

3.5. Assoc. Prof. Ishak bin Ismail, Dean

3.5.1. Dr. Mohamed Arif bin Nun, Head of Department, Communications Eng.

Faculty of Surveying

3.6. Assoc. Prof. Abdul Wahid bin Haji Idrus, Dean

3.6.1. Encik Mohd. Ibrahim bin Seeni Mohd., Deputy Dean

3.6.2. Assoc. Prof. Mohd. Azmi bin Ariffin, Head of Department, Property Management and Valuation

Faculty of Built Environment

3.7. Assoc. Prof. Omar bin Munir, Dean

3.7.1. Assoc. Prof. Elias bin Salleh, Deputy Dean

3.7.2. Assoc. Prof. Amiruddin bin Abu Bakar, Head of Department, Urban and Regional Planning

3.7.3. Encik Ahmad bin Mohd. Taib, Head of Department, Quantity Surveying

3.7.4. Encik Haji Muhammad Juhari bin Haji Daud, Head of Department, Architecture

Centre for Humanities Studies

3.8. Encik Abdul Hamid bin Awang, Chairman

4. National Institute of Public Administration

4.1. Dr. Mohammad Shahari, Director

4.2. Encik Abdul Halim Raof, Deputy Director (Management)

4.3. Encik Ahmad Zabri Ibrahim, Deputy Director (Academic Affairs)

4.4. Encik Badri Masri, Head, Centre for Strategic Studies and Development

4.5. Encik V. Danabalan, Head, Project Implementation Unit (Dev.)

4.6. Encik Ahmad Bakri Shabdin, Head, Training Development Unit

4.7. Dr. Abdullah Abdul Rahman, Head, Centre for Management

4.8. Encik Abi Musa Ansari, Programme Co-ordinator

5. Palm Oil Research Institute of Malaysia

5.1. Tan Sri Datuk Dr. Anuwar bin Mahmud, Director-General

5.2. Encik Wan Nasir Daud, Director, Administration and Finance Division

5.3. Dr. Haji Abdul Halim bin Hj. Hohd. Hassan, Director, Biology Division

5.4. Prof. Augustine Ong, Director, Chemistry and Technology Division

5.5. Dr. P.A.T. Swoboda, Senior Research Fellow, Chem. and Tech. Division

6. Malaysian Institute of Management

6.1. Mr. Lawrence C.K. Teh, Head, Public Programmes

6.2. Encik S. Thiagarajah (Rajah), Head, In-Company Programmes

7. National Productivity Centre

7.1. Encik Ahmad Berek, Deputy Director

8. Rubber Research Institute of Malaysia

8.1. Dr. Samsudin bin Tugiman, Head, Training, Personnel and Staff Development Division

8.2. Encik Cho Shue Nam, Group Leader Training Section

8.3. Encik E.M. Harris, Training Section, Natural Rubber Production Technology Division

8.4. Dr. Wan Idris, Head, Technical Advisory Service

9. Standards and Industrial Research Institute of Malaysia

9.1. Encik Mohamad Anas, Director of Administration

9.2. Dr. Rahim Bidin, Director of Industrial Research

9.3.

10. Asia and Pacific Development Centre

10.1. Mr. Aftab Ahmad Khan, Director

11. MARA Skills Centre

11.1. Encik Harim Bakar, Deputy Director of Skills Training

11.2. Encik Zahudi bin Abdullah Jalil, Deputy Director, Entrepreneur Development Division

SINGAPORE

12. Ministry of Finance - Revenue Division

12.1. Mr. Lim Sang Hock, Assistant Director, Administration and Technical Aid

12.2. Mr. Balâretnam

13. Ngee Ann Technical College (NATC)

13.1. Mr. Khong Kit Soon, Principal

13.2. Mr. F.A. Vasenwala, Deputy Principal

13.3. Mr. Lim Seah Eng, Head of Department, Business Studies

13.4. Mr. Chan Yoke Lock, Head of Department, Electrical and Electronic Engineering

13.5. Mr. M.M. Hoda, Head of Department, Mechanical Engineering

13.6. Dr. A.K.M. Moazzem Hussain, Head of Department, Shipbuilding and Repair Technology

13.7. Mr. Cheah Ah Lee, Head of Department, Building

13.8. Mr. Khang Sek Eng, Administration

14. Vocational and Industrial Training Board (VITB)

14.1. Mr. Koh Watt Seng, Divisional Director, Special Projects

14.2. Mr. Peter Sydall, Divisional Director, Training

14.3. Mr. Yip Seck Weng, Divisional Director, Curriculum and Resources

14.4. Mr. Chiang Cheng Pun, Manager, Curriculum Development

14.5. Mr. T.A. Rajasingam, Head, Curriculum Unit 4

14.6. Mr. Tham Kin Foon, Manager, Industry Based Training

14.7. Mr. Ong Cheng Huat, Manager, Tests and Examinations

15. Singapore Polytechnic

15.1. Mr. Cheng Huang Leng, Acting Deputy Vice-Principal

15.2. Mr. R.K. Agrawal, Acting Head, Marine Engineering Division

15.3. Captain R.D. Vardon, Acting Head, Nautical Studies

15.4. Mr. Yeow Kian Peng, Acting Head, Chemical Process Technology

16. Singapore Institute of Standards and Industrial Research

16.1. Mr. Ong Chor Eong, Director, Materials and Electro-Technology

16.2. Mr. Heng Keng Wah, Head, Non-Destructive Testing and Metallurgy Section

16.3. Mr. Seow Hong Pheow, Principal Metallurgist

16.4. Mr. Lim Hong Tan, Senior Officer, Planning and Development Division

17. National University of Singapore

17.1. Miss Ng Wan Eng, Public Relations Officer

17.2. Associate Professor Bong Tet Yin, Faculty of Engineering

17.3. Dr. Ching Chi Bun, Chemical Engineering Department, Faculty of Engineering

18. Singapore Institute of Management

18.1. Mr. Victor S.C. Yee, Programme Executive

18.2. Mrs. Chong Keng Boon, Programme Executive

19. National Productivity Board

19.1. Miss Wee Siew Hong, Public Relations Officer

19.2. Mr. Low Choo Tuck, Manager, Promotion and Information Service Unit

19.3. Mr. Quek Cheow Wah, Senior Officer, Course Administration

19.4. Mr. Bernard Poon, Manager, Industrial Engineering and Automation Unit

19.5. Mr. Ling Kwong Ung, Senior Consultant, Industrial Engineering and Automation Unit

19.6. Mr. D. Ang Keng Hong, Manager, Management Services and Training Unit

19.7. Mr. Alex Wong, Senior Consultant, Supervisory Development

19.8. Mr. Danny Lam Kwong Foo, Manager, Labour-Management Relations Unit

19.9 Mr. See Yat Tuck, Consultant, Computer Services Unit

DOCUMENTS MADE AVAILABLE FOR EXAMINATION

1. University of Technology Malaysia

1.1. Memorandum for the Accreditation of the Bachelor of Quantity Surveying

1.2. Memorandum for the Accreditation of the Bachelors Degree in Urban and Regional Planning

1.3. Memorandum Department of Architecture - Accreditation for Bachelor of Architecture

1.4. Prospectus 1980/81 Bachelor of Surveying (Land)- Degree Curriculum

1.5. Prospectus 1981/82 Diploma in Land Surveying - Curriculum

1.6. Integrated Course in Property Management - Curriculum Leading to Diploma in valuation and Bachelor of Surveying (Property Management)

1.7. Report by the Department Advisory Panel on the Development of the Department of Petroleum and Natural Gas Engineering - 12 February 1981

1.8. Handbook - Faculty of Civil Engineering

1.9. Faculty of Civil Engineering - Curriculum and Syllabus

1.10. Descriptive Handbook - Civil Engineering Laboratories

1.11. Report, National Workshop on Co-operation Among Industries, Research Instituttions and Universities, March 4th, 5th, 6th, 1980.

2. National Institute of Public Administration (INTAN)

2.1. INTAN '80 Training Projects

2.2. INTAN '81 Training Projects

2.3. Course Programme 6th Agro-Based Industrial Development Course, 24th August to 21st November 1981

2.4. Production Management Course Programme,24th August to 29th August 1981

2.5. Information Booklet for International Students

3. Palm Oil Research Institute of Malaysia (PORIM)

3.1. Annual Report - 1980

3.2. Brochure - General Information

3.3. International Symposium, Kuala Lumpur February 1981 - Current and Prospective Situations of the Oil Palm/Palm Oil Industry

3.4. PORIM Bulletin - May 1981

3.5. PORIM Technology Handbooks

3.5.1. The Refining of Palm Oil - April 1981

3.5.2. Use of Palm Stearin in Soaps April 1981

3.5.3. Oleins and Stearins from Malaysian Palm Oil Chemical and Physical Characteristics - May 1981

3.5.4. Malaysian Palm Oil - Chemical and Physical Characteristics - May 1981

3.5.5. The Use of Palm Oil Products in Margarines - August 1981

3.6. Occasional Paper - Food Uses of Palm Oil - April 1981

3.7. Paper - Sampling and Extraction Method of Fresh Fruit Bunch of Oil Palm

4. Malaysian Institute of Management (MIM)

4.1. Annual Report - 1980

4.2. Membership Information

4.3. Management Development Programmes - 1981

4.4. Newsletters (M.I.M. Publication to Members) Dated April, June and August 1981

5. National Productivity Centre

5.1. Training Programme 1981

5.2. Information Bulletin January - June 1980

5.3. Information Bulletin July - December 1980

5.4. Course Details

5.4.1. Introduction to Marketing 3rd - 7th August 1981

5.4.2. Import Procedures and Documentation - 5 days

5.4.3. Industrial Relations for Supervisors 7th - 11th September 1981

5.4.4. Domestic Inquiry Procedures 2nd - 4th September 1981

5.4.5. Performance Appraisal for Chief Executives - 1 day Seminar
Performance Appraisal for Managers - 4 day Course

6. Rubber Research Institute of Malaysia (R.R.I.M.)

6.1. Rubber esearch Institute of Malaysia Information Booklet

6.2. Prospectus - Diploma in Natural Rubber Processing

6.3. Prospectus - Training Courses

6.4. Short Course Details

6.4.1. Natural Rubber Processing

6.4.2. Soil and Foliar Analysis; Latex, Rubber and Effluent Analysis

6.4.3. Rubber Processing Machinery and Maintenance

6.4.4. Soils, Management of Soils and Nutrition of Hevea

6.4.5. Crop Protection and Weed Control in Rubber Plantations

6.4.6. Estate Management and Planning

6.4.7. Rubber Planting and Nursery Techniques

6.4.8. Tapping, Tapping Systems and Yield Stimulation of Hevea

7. Standards and Industrial Research Institute of Malaysia (S.I.R.I.M.)

7.1. Laws of Malaysia - Act 157 - S.I.R.I.M. (Incorporation Act) 1957

7.2. Metrology Services - Calibration and Measurement

7.3. A Factual Broadsheet

7.4. Scientific Testing Servies

7.5. Organization Chart

7.6. Directory - Malaysian Standard 1980

7.7. Annual Reports 1975/76/77

7.8. Buyers Guide to Certified Products

7.9. Metal Industry Technology Centre (MITEC)

7.10. MITEC Newsletter

8. Asian and Pacific Development Centre

8.1. Brochure - Inaguaration Ceremony 17th August 1981

8.2. Explanatory Leaflet

9. Mara Skills Centre

9.1. Guide Book, How to Establish a New Business (In Bahasa Malaysia)

10. Ngee Ann Technical College

10.1. Prospectus - 1981/1982

10.2. Annual Report - 1979/1980

10.3. Proposed 5 year Plan (1981-85) - Electrical and Electronic Engineering Department

10.4. Detailed Syllabus - Building Department

10.5.General Information Leaflets

10.5.1. Electrical and Electronic Engineering

10.5.2. Building Department

10.5.3. Business Studies Department

10.5.4. Mechanical Engineering Department

10.5.6. Shipbuilding and Repair Technology

10.5.7. Department of Business Studies - One Year Part Time Course - Diploma in Marketing and Management

10.5.8. Department of Business Studies - Part Time Evening Course - Industrial Maintenance

10.5.9. Department of building - Short Course - Lift and Escalator Maintenance

10.5.10. Ngee Ann Technical College

11. Vocational and Industrial Training Board (V.I.T.B.)

11.1. The Vocational and Industrial Training Board Act. 1979 (No. 4 of 1979)

11.2. V.I.T.B. Qualifications

11.3. Testing and Certification System

11.4. Prospectus - National Trade Certificate and Certificate of Competency Courses

11.5. Prospectus - Diploma, Industrial Technician Certificate and Commercial Education Courses

11.6. V.I.T.B. Annual Report 1979/1980

11.7. Brochure - The Vocational and Industrial Training Board

11.8. Part-Time Continuing Education and Training Programmes

11.9. Handbook on Work Attitudes

11.10. Trainees Handbook

11.11. V.I.T.B. Newsletter 31st August 1981

11.12. Tomorrow's Workforce (Trainees' Newsletter) August 1981

11.13. Handbook - Final Guidelines - Phase I - Training Needs Identification

11.14. Handbook - Final Guidelines - Phase II - Setting Training Objectives

11.15. Handbook - Final Guidelines - Phase III - Designing Instruction

11.16. Brief on the Industry Based Training Department

11.17. Copy - Apprenticeship Contract

11.18. Brief on National Trade Certification - 2 Training Schemes

11.19. Outline N.T.C. 2 Full Time Apprenticeship Scheme in Precision Machining

11.20. Test Syllabus (Practical) N.T.C. 3 Metal Machining

12. Singapore Polytechnic

12.1. Singapore Polytechnic Prospectus 1981 - 82

12.2. Leaflets - Plan a Career in -

12.2.1. Marine Engineering Technology

12.2.2. Marine Radio Officer

12.2.3. Shipmaster and Deck Officer

12.2.4. Chemical Process Technology

12.2.5. Building Technology

12.2.6. Civil Engineering Technology

12.2.7. Land Surveying Technology

12.2.8. Structural Engineering Technology

12.2.9. Electronics and Communications Engineering Technology

12.2.10. Electrical Engineering Technology

12.2.11. Mechanical Engineering Technology

12.2.12. Production Engineering Technology

12.2.13. Architectural Draughtsmanship

12.3. Annual Reports 1979/80 - 1980/81

13. Singapore Institute of Standards and Industrial Research (S.I.S.I.R.)

13.1. Annual Reports, 1979/80 - 1980/81

13.2. S.I.S.I.R. - What it is and What it does - Descriptive Leaflet

14. National University of Singapore

14.1. Annual Report 1979 - 80

14.2. Faculty of Engineering 1981

15. Singapore Institute of Management (S.I.M.)

15.1. Annual Report 1980

15.2. Library List

15.3. Short Course and Seminar Programme April to September 1981

15.4. Short Course and Seminar Programme October 1981 to March 1982

15.5. Asian Executive Development Programme September 17th - 23rd, 1981
Organized by Asian Assoc. Man. - Organized and hosted by S.I.M.

15.6. The Job of the Chief Executive April 26th - May 1st, 1981

16. National Productivity Board (N.P.B.)

16.1. Annual Report 1979/80

16.2. Training within Industry for Supervisors, Programmes of Courses and Information 1981

16.3. Singapore Productivity News - August 1981

16.4. Minimax May/June 1981 (Bimonthly Journal of N.P.B.)

16.5. Training Programmes January - June and July - December 1981

16.6. Report of the Committee on Productivity

16.7. Executive Development Programme

16.8. Guide to QC Circles (QC = Quality Control)

16.9. Top Management Development Programme 1981

16.10. Organization Chart and Functions - Course Administration

16.11. Leaflets on Courses

16.11.1. Industrial Hydraulics

16.11.2. Basic Industrial Pneumatics

16.11.3. QC Circle Facilitator

16.11.4. Safety in Petrochemical Plant Operations

16.11.5. Computer Data Processing - Certificate Course

16.11.6. Computer Programming - Certificate Course

16.11.7. National Computing Centre Library for Systems Analysis

16.12. Information Leaflet - What is N.P.B.?

16.13. Supervisory Development Modular Programme

Annex III

DEPARTMENTS WITHIN THE FACULTIES IN UNIVERSITY OF TECHNOLOGY MALAYSIA AND ACADEMIC STAFF STRENGTHS IN EACH FACULTY

(a) Mechanical Engineering Faculty .....77...(12)

- a.1. Department of Thermofluids
- a.2. Department of Mechanics and Design
- a.3. Department of Petroleum and Natural Gas
- a.4. Department of Marine Engineering
- a.5. Department of Aeronautical Engineering
- a.6.
- a.7.

(b) Civil Engineering Faculty .....51...(16)

- b.1. Department of Geology and Soil Mechanics
- b.2. Department of Structure and Material
- b.3. Department of Hydraulics and Hydrology
- b.4. Department of Environmental Engineering

(c) Electrical Engineering Faculty .....57...(16)

- c.1. Department of Control and Systems Engineering
- c.2. Department of Electronics and Communications Engineering
- c.3. Department of Electrical Power Engineering

(d) Faculty of Surveying .....49....(9)

- d.1. Department of Astronomy and Geodesy
- d.2. Department of Photogrammetry and Cartography
- d.3. Department of Engineering and Cadastral Surveying

(e) Faculty of Sciences

- e.1. Department of Physics .....44....(8)
- e.2. Department of Mathematics .....44....(5)
- e.3. Department of Chemistry .....40...(11)
- e.4. Department of Computer Sciences .....11....(1)

(f) Faculty of Built Environment .....49....(4)

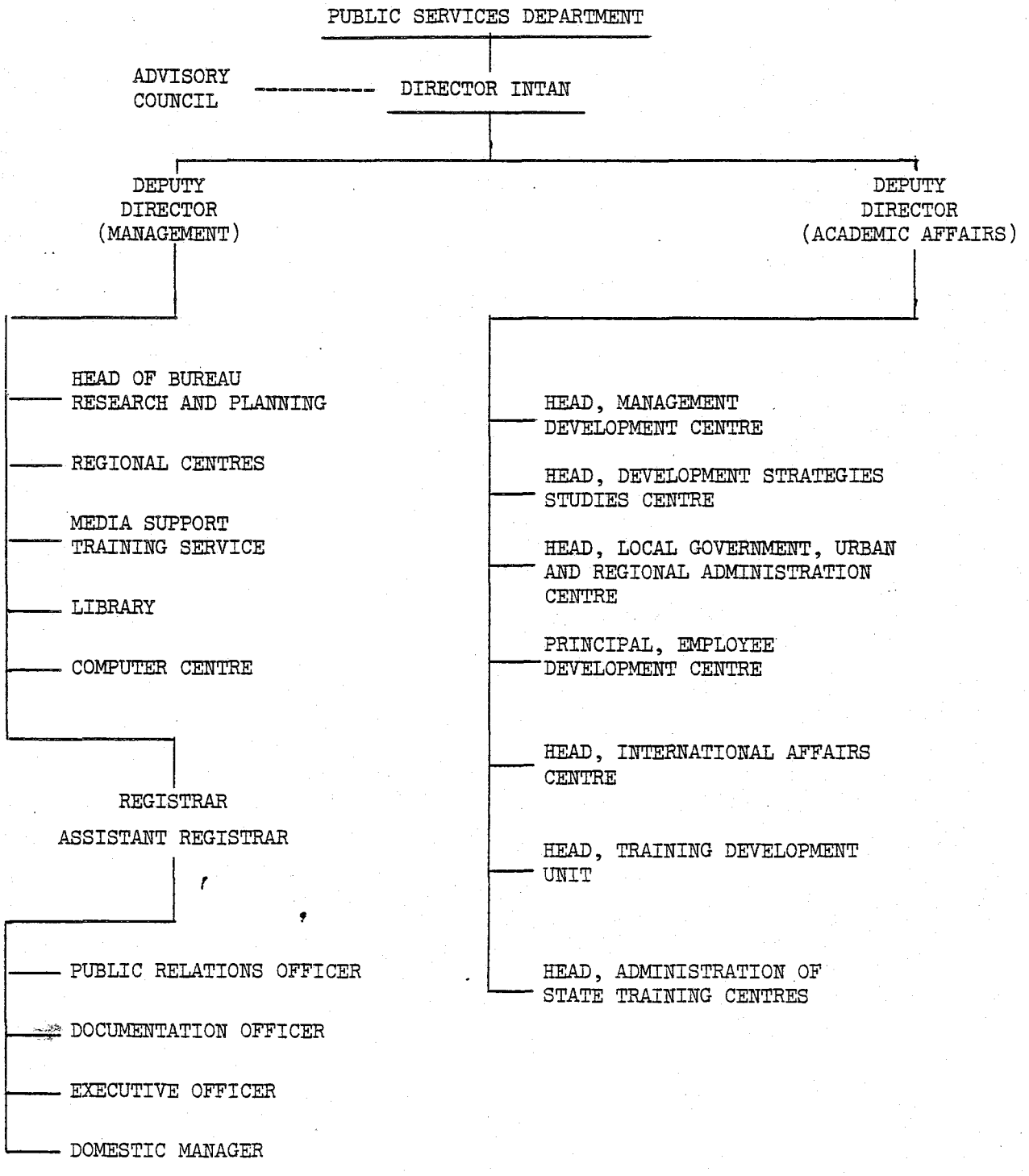
- f.1. Department of Urban and Regional Planning
- f.2. Department of Quantity Surveying
- f.3. Department of Architecture

(g)	Centre for Humanities Studies	59....(6)
	Total Academic Staff	473...(88)

Note: The numbers given in the left column include the staff on study leave shown in brackets. These figures were given in August 1981 and it was understood that the ratio of staff on study leave to total staff was typical.

Annex IV

ORGANIZATION CHART, NATIONAL INSTITUTE OF PUBLIC ADMINISTRATION (INTAN)



Annex V

MEMBERSHIP AND FUNCTIONS OF THE ADVISORY COUNCIL FOR THE NATIONAL INSTITUTE OF PUBLIC ADMINISTRATION (INTAN)

The Advisory Council is established to guide and assist INTAN in achieving its objectives. The functions of the Advisory Council are:

1. To advise INTAN in the development and management of its training programme;

2. To advise INTAN on the procurement of institutional support, technical advice and management expertise from local and foreign agencies;

3. To promote close relationship and co-ordination between INTAN and other institutions of higher learning and training;

4. To guide and assist INTAN in developing its capability as the national institution of management training and development administration;

5. To review from time to time INTAN's activities and progress of work;

6. To make such other rules and regulations as may be necessary from time to time for the conduct of INTAN's activities.

The Council shall be made up of permanent and appointed members as follows:

(i) The permanent members consist of:

(a) The Director-General of Public Services Malaysia - Chairman

(b) The Secretary-General, Ministry of Education - Deputy Chairman

(c) The Secretary-General to the Treasury

(d) State Secretaries of three States, one of whom shall be from Sabah or Sarawak

(e) Director, Training and Career Development Division, Public Services Department

(f) Director-General, Implementation Co-ordination Unit

(g) Director-General, Malaysian Administrative, Modernization and Manpower Planning Unit

(h) Dean, Faculty of Economics and Management, University Kebangsaan

(i) Director INTAN - Secretary

(ii) Appointed members who shall not exceed six in numbers to be appointed by the Chairman to serve on the Council for a period not exceeding three years

(iii) The Council shall meet at least twice a year

An appointed member shall, unless his appointment is sooner terminated or revoked, serve for a term of two years but shall be eligible for re-appointment.

An appointed member who fails to attend three consecutive meetings of the Council, for reasons unknown to the Secretary, shall be deemed to have resigned from membership of the Council.

Annex VI

TRAINING ORGANIZATION AND PROGRAMME HEADINGS AT THE NATIONAL INSTITUTE OF PUBLIC ADMINISTRATION (AT THE END OF 1980)

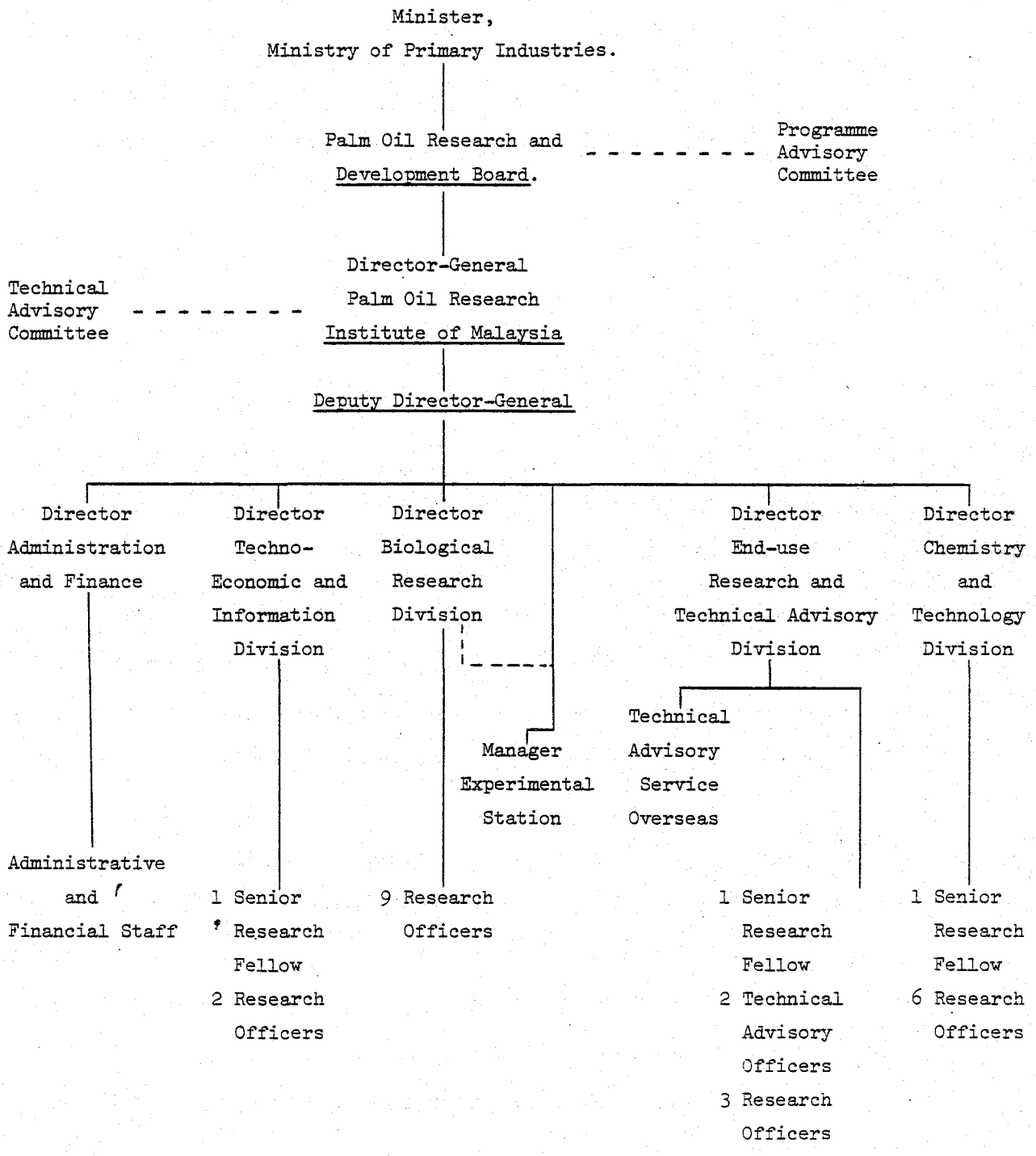
1.	Centre for Management Development	- Training Staff Strength
	1.1. Financial Management	8 Programme Co-ordinators
	1.2. Personnel Management	23 Senior Project Officers
	1.3. Management Science	1 Senior Systems Analyst
	1.4. Systems Analysis	1 Systems Analyst
	1.5. Basic Management	3 Programmers
	1.6. Advanced Management	
	1.7. Administrative and Diplomatic Service Cadet	
2.	Centre for Strategic Studies and Development	- Training Staff Strength
	2.1. Regional Development and Agricultural	5 Programme Co-ordinators
	2.2. Social Development	1 Senior Project Officer (Engineer)
	2.3. Development Policy	10 Senior Project Officers
	2.4. Public Enterprises	1 Senior Agricultural Officer
	2.5. Agro-based Industrial Development	
3.	Centre for Local Government, Urban and Regional Administration	- Training Staff Strength
	3.1. Urban Studies	
	3.2. Urban Development	2 Programme Co-ordinators
	3.3. Urban and Regional Planning	8 Senior Project Officers
	3.4. Local Government	
	3.5. Public Housing	
	3.6. Environment Management	
	3.7. Evaluation and Assessment	
4.	Centre for International Affairs	- Training Staff Strength
	4.1. International Relations	3 Programme Co-ordinators
	4.2. International Trade	6 Senior Project Officers
	4.3. International Economics, Defence and Security	

5.	Employee Development Centre	- Training Staff Strength
	5.1. Clerical Training	1 Senior Project Officer
	5.2. Supervision Training	4 Chief Assistant Training Officers
	5.3. Language Training	12 Senior Assistant Training Officers
	5.4. Office Management	20 Assistant Training Officers
6.	Bureau of Research and Planning	- Staff Strength
	6.1. Diagnostic Research	5 Chief Research Officers
	6.2. Revaluative Research	
	6.3. Planning and Implementation	12 Senior Project Officers
	6.4. Publication	
7.	Planning Implementation Unit	- Staff Strength
	Co-ordinating the Expansion Development Programme	1 Project Architect
		1 Resident Engineer
		1 Procurement Officer

Note: All staff listed against each centre may not necessarily be directly involved in a training capacity but rather in an administrative or co-ordinating capacity.

Annex VII

ORGANIZATION STRUCTURE OF PORIM. (31st Dec. 1980)



The senior staff personnel are adequately supported by clerical, administrative and general duty staff.

Annex VIII

THE FUNCTIONS AND ACTIVITIES OF PORIM

Functions:

To conduct and promote research into the production, extraction processing, storage, transportation, marketing, consumption and end used of palm oil and oil palm products. To exploit and develop these research results and to provide a technical advisory service to consumers in addition to the collation and dissemination of information relating to palm oil and oil palm products.

Activities:

Activities presently carried out or to be embarked upon in the immediate future.

1. Research on the chemistry and technology of palm oil to

   (a) improve the efficiency extraction and refining;

   (b) ensure high quality;

   (c) overcome factors of oxidation, bleachability and crystallisation currently limiting the uses of palm oil for edible purposes.

2. End-use research to

   (a) increase the proportion of palm oil used in edible and inedible products;

   (b) improve the performance of palm oil in its present usage;

   (c) to discover new used for palm oil and its derivatives.

3. Provision of technical advisory services to

   (a) users of Malaysian palm oil to promote its wider use;

   (b) provide the latest technical information on palm oil and its utility;

   (c) solve processing and formulation problems.

4. Techno-economic studies to

   (a) collect and analyse data relating to the Malaysian palm oil industry;

   (b) carry out an analysis of marketing information;

   (c) examine data collected on the supply and marketing of other oils and fats.

5. Biological research to

   (a) minimise production costs by breeding for higher yield and improving agronomic practices;

   (b) modify favourably the composition of the oil by developing hybrid plants to produce more liquid, unsaturated oil;

   (c) research into genetics, breeding, propogation, physiology, agronomy, pests and diseases for improved production and quality;

   (d) examine biological aspects of effluent disposal.

6. Provide a special advisory service to smallholders in the Malaysian oil palm industry.

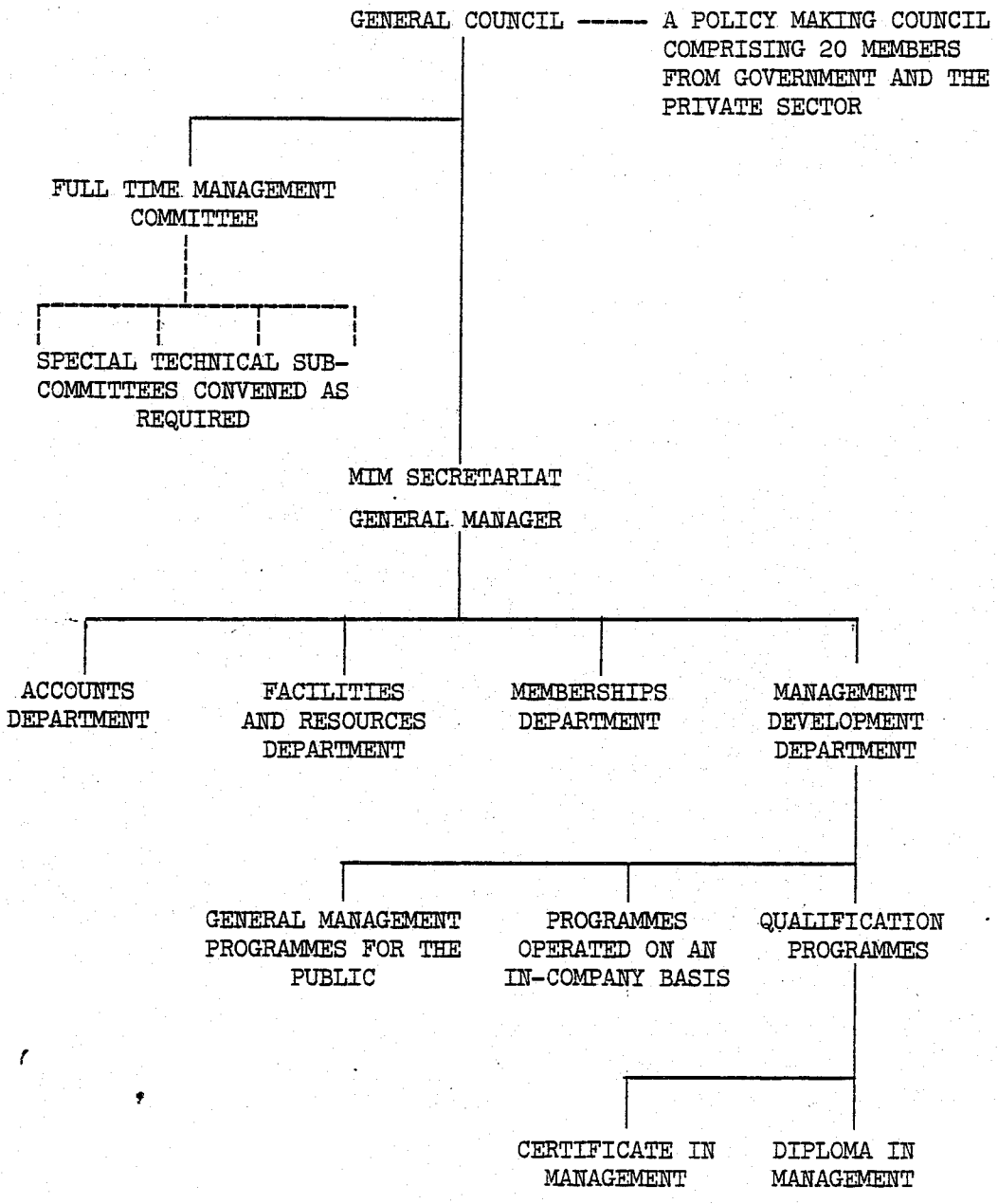
Annex IX

SPECIALISED RESEARCH EQUIPMENT AVAILABLE IN PORIM RESEARCH LABORATORIES

1. Ultra violet and infra red spectrophotometers
2. Atomic absorption spectrometer
3. Automatic Lovibond tintometer
4. Differential scanning calorimeter
5. Gas liquid chromatography
6. Latroscan quantitative thin layer chromatography
7. Polarising microscope
8. Fat stability testing equipment
9. Pilot plant for producing experimental shortenings and margarines
10. Food technology equipment for testing fat products in cakes, ice creams, bakery coatings, fried foods and etc
11. Specialised equipment for comparative measurement of food products

Annex X

SCHEMATIC ORGANIZATION STRUCTURE MIM



Annex XI

RANGE OF TRAINING COURSES OFFERED BY MIM DURING 1981

	Title	Period - Approximate duration		Cost Members/Non-members
1.	General Management			
1.1.	Agricultural management	Day (10)	70 hours	M$1,000 *
1.2.	Basic management	Day (12)	77 hours	M$1,000/M$1,200 *
1.3.	Basic supervisory	Evenings (2) Day	40 hours 40 hours	M$400/M$500 M$550/M$690
1.4.	Certificate in management Initially offered to Sabah and Sarawak States in East Malaysia (North Borneo) as a 4 module course each of about 4½ months duration consisting of periods of direct instruction interspersed with correspondence study. Successful candidates may then attend an intensive 2 weeks day and evening course in Kuala Lumpur to qualify for the diploma in management.			
1.5.	Diploma in management	Evenings (2)	350 hours	Financially sponored members only
1.6.	Essence of management	Day (2)	14 hours	M$220/M$270 *
1.7.	Introduction to management	Evening	40 hours	M$400/M$500
1.8.	Principles and practice of management	Day (4)	28 hours	M$420/M$530 *
1.9.	Plantation management course	Residential	2 weeks	M$2,600
1.10.	Senior managers programme	Residential	1 week	M$1,500
1.11.	Young managers programme	Residential	2 weeks	M$2,000
2.	Financial management/Managerial accounting			
2.1.	Accounting standards and their application	Day (6)	38 hours	M$550/M$690
2.2.	Budgeting and budgetary control	Day (3)	21 hours	M$330/M$410
2.3.	Costing and cost control	Day (2)	14 hours	M$220/M$270

Annex XI (cont'd)

Title		Period - Approximate duration		Cost Members/Non-members
2.4.	Financial analysis for non-financial executives	Day (2)	14 hours	M$220/M$270
2.5.	Financial analysis	Evening	40 hours	M$400/M$500
2.6.	Financial management	Evening	40 hours	M$400/M$500
2.7.	Financial planning and control	Evening	25 hours	M$275/M$350
2.8.	Financial statement analysis	Day (2)	14 hours	M$220/M$270
2.9.	Introductory accounting	Evening	40 hours	M$400/M$500
2.10.	Managerial accounting	Evening	25 hours	M$275/M$350
2.11.	Profit and cash flow management	Day (3)	21 hours	M$330/M$410
2.12.	Techniques of credit management	Day (2)	14 hours	M$220/M$270
2.13	Zero-base budgeting	Day (2)	14 hours	M$200/M$270
3.	Marketing management			
3.1.	How to be a better salesman	Day (2)	10 hours	M$/220/M$270
3.2.	Marketing management	Evening	40 hours	M$400/M$500
3.3.	How to negotiate and win	1 day	7 hours	M$110/M$140
3.4.	How to write and use marketing plans	Day (5)	35 hours	M$220/M$270
3.5.	Sales forecasting	Day (2)	14 hours	M$220/M$270
3.6.	Sales force management	Day (3)	21 hours	M$330/M$410
3.7.	Sales management	Day (3)	21 hours	M$330/M$410
3.8.	Sales motivation	Day (2)	14 hours	M$220/M$270
3.9.	Sales power and personal development	1 day	7 hours	M$110/M$140
4.	Personnel management			
4.1.	Developing a sophisticated and comprehensive wage and salary administration system	Day (2)	14 hours	M$220/M$270
4.2.	Effective staff selection	1 day	7 hours	M$110/M$140

Annex XI (cont'd.

Title		Period - Approximate duration		Cost Members/Non-members
4.3.	Manpower planning	Day (2)	14 hours	M$110/M$140
4.4.	Personnel management and industrial relations	Evening	40 hours	M$400/M$500
4.5.	Selection and interviewing techniques	1 day	7½ hours	M$110/M$140
4.6.	Training and management development	Day (2)	14 hours	M$220/M$270
5.	Production management			
5.1.	Effective materials purchasing and controlling	Day (3)	21 hours	M$330/M$410
5.2.	Work study	Day (3)	21 hours	M$330/M$410
5.3.	Inventory management and control	Day (3)	17 hours	M$330/M$410
5.4.	Materials management	Day (3)	21 hours	M$330/M$410
5.5.	Production scheduling	Day (3)	21 hours	M$330/M$410
5.6.	Quality control management	Day (2)	14 hours	M$220/M$270
5.7.	Production management for supervisors	Evening	40 hours	M$400/M$500
6.	Behavioural techniques			
6.1.	Creative thinking and problem solving	Day (3)	21 hours	M$330/M$410
6.2.	Effective communication	Day (2)	14 hours	M$220/M$270
6.3.	Effective speaking	Day	25 hours	M$275/M$350
6.4.	Effective human and interpersonal relations	Day (3)	21 hours	M$330/M$410
6.5.	Effective supervision	Day (2)	14 hours	M$220/M$270
6.6.	Effective written communication	Day	25 hours	M$330/M$380
6.7.	How to maximize decision making and delegation skills	Day (2)	14 hours	M$220/M$270
6.8.	How to sharpen business writing skills	Day	25 hours	M$300/M$380
6.9.	Implement management appraisal and development	Day (2)	14 hours	M$220/M$270

Annex XI (cont'd)

	Title	Period - Approximate duration		Cost Members/Non-members
6.10.	Leadership and human relation skills for supervisors	Day (3)	21 hours	M$330/M$410
6.11.	Leadership and supervision	Day (2)	14 hours	M$220/M$270
6.12.	Leadership styles, motivation and team building skills	Day (2)	14 hours	M$220/M$270
6.13.	Management effectiveness and management by objectives	Day (2)	14 hours	M$220/M$270
6.14.	Making an effective presentation	1 day	7 hours	M$110/M$140
6.15.	Managing meetings effectively	1 day	7 hours	M$110/M$140
6.16.	Managing people	Day (2)	14 hours	M$220/M$270
6.17.	Motivating individuals and building teamwork	Day	24 hours	M$300/M$380
6.18.	Motivation and productivity	Day (2)	14 hours	M$220/M$270
7.	Quantitative techniques			
7.1.	Critical path method	Day (2)	14 hours	M$220/M$270
7.2.	Forecasting techniques for executives	Day (2)	14 hours	M$220/M$270
7.3.	Network analysis	Day (3)	21 hours	M$330/M$410
7.4.	Project management and control	Day (2)	14 hours	M$220/M$270
7.5.	Quantitative approach to problem solving	Day (3)	21 hours	M$330/M$410
7.6.	Work methods improvement	Day (3)	21 hours	M$330/M$410
8.	Secretarial courses			
8.1.	Telephone techniques and courtesies	1 day	7 hours	M$110/M$140
8.2.	The effective secretary	Evening	40 hours	M$400/M$500
8.3.	The problem solving secretary	Day	24 hours	M$300/M$380
8.4.	The secretary in management today	Day (2)	14 hours	M$220/M$270

Annex XI (cont'd)

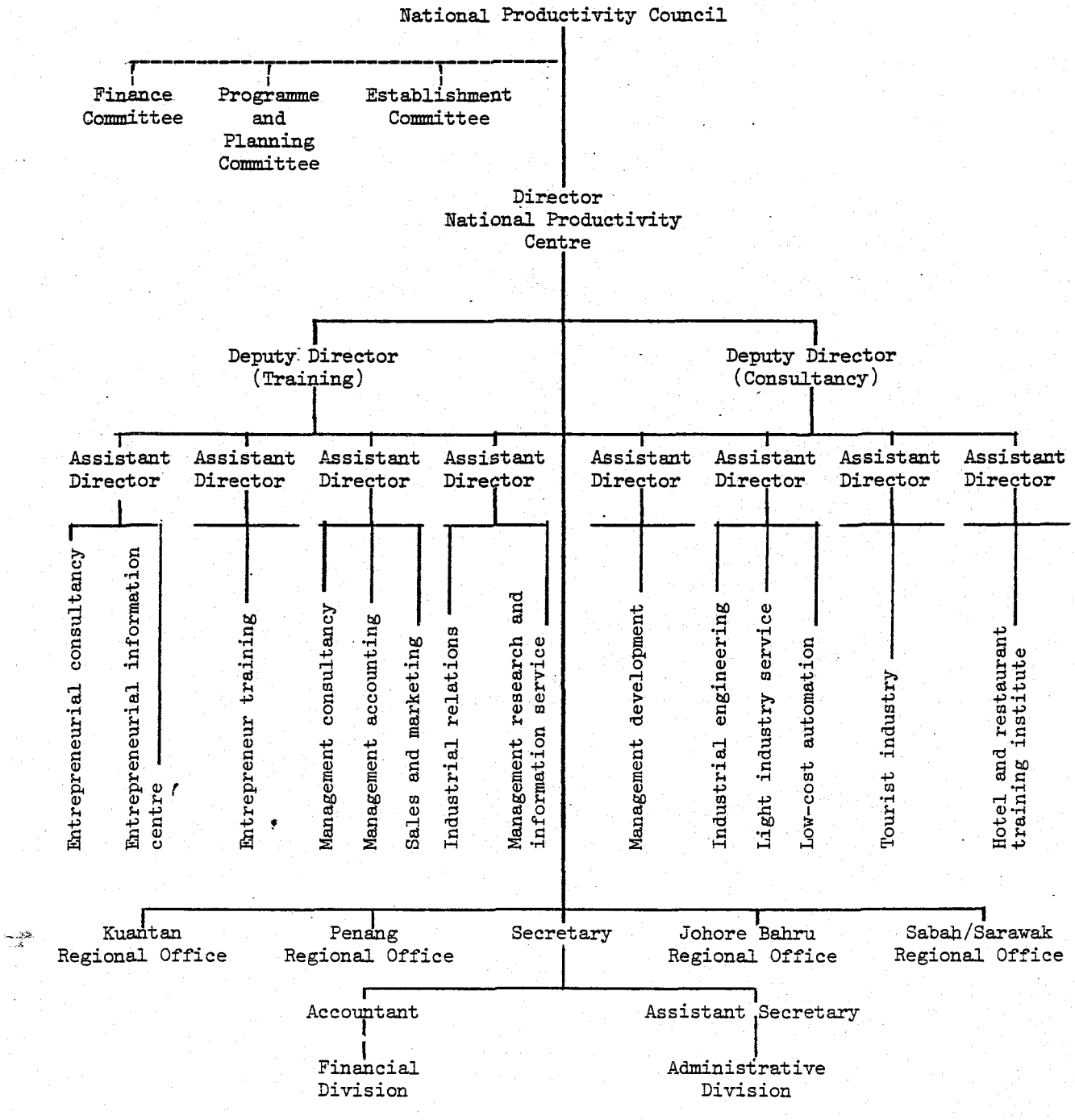
	Title		Period - Approximate duration		Cost Members/Non-members
9.	Industrial relations				
	9.1.	Industrial relations	Day (2)	14 hours	M$220/M$270
	9.2.	Labour laws in	Day (2)	14 hours	M$220/M$270
10.	Miscellaneous				
	10.1.	An understanding of company law	Evening	25 hours	M$275/M$350
	10.2.	Corporate public relations	Evening	25 hours	M$275/M$350
	10.3.	Computer appreciation	Evening	7½ hours	M$330/M$410
	10.4.	Course leaders course	Residential	1 week	M$1,500/M$1,900
	10.5.	Developing computer-based payroll systems	Day (3)	21 hours	M$330/M$410
	10.6.	Effective O and M and office administration	Day (3)	21 hours	M$330/M$410
	10.7.	Malaysian corporate income tax	Day (2)	14 hours	M$220/M$270
	10.8.	Organization and management of the office service function	Day (2)	14 hours	M$220/M$270
	10.9.	Time management	1 day	7 hours	M$110/$140

NOTE:
1. All day and residential courses include food and accommodation.
2. Many day courses are also offered as evening courses.
3. Courses are also offered in centres outside Kuala Lumpur.
4. In addition to the courses MIM presents about 41 management training films throughout the year at a cost of M$7.50 for members and M$30.00 for non-members.
5. MIM also offers in-company training programmes tailored to the company needs.

Annex XII

ORGANIZATIONAL CHART FOR THE NATIONAL PRODUCTIVITY CENTRE (NPC)

September 1981



Annex XIII

LIST OF TRAINING COURSES AVAILABLE AT NPC (1981)

	Title	Duration Days	Cost M$
1.	**Management accounting section**		
1.1	Basic accounting for executives	5	200
1.2	Budgetary control	3	-
1.3	Introduction to accounting practices	5	150
1.4	Financial management	5	-
1.5	Project evaluation and control	5	200
1.6	Financial management I	3	120
1.7	Planning and control through management accounting I	3	120
1.8	Cash flow management	3	120
1.9	Financial management II	3	120
1.10	Planning and control through management accounting II	3	120
2.	**Sales and marketing section**		
2.1	Salesmanship	5	200
2.2	Sales management	5	250
2.3	Introduction to marketing management	5	200
2.4	Setting up export business and documentation	5	250
2.5	Marketing research	5	250
2.6	Import procedures and documentation	5	250
2.7	Basic management programme	10	-
2.8	Profits through advertising	5	250
2.9	Strategy for market creation and development	5	250
2.10	Diploma programme in marketing management	Between September 1980 to April 1982	
3.	**Industrial relations section**		
3.1	Management of labour relations	5	250
3.2	Discipline in industry	5	250
3.3	Grievance handling	3	150
3.4	Industrial relations for supervisors	5	200
3.5	Industrial relations for Trade Union executives	5	150

	Title	Duration Days	Cost M$
3.6	Domestic inquiry procedures	3	150
3.7	Collective bargaining and negotiation procedures	5	250
3.8	Industrial relations and labour law	5	250
3.9	Industrial conflicts and remedies	5	250
4.	Management development section		
4.1	Leadership and human relations for managers		
4.2	Introduction to personnel management		
4.3	Training methodology (Module I Aids and Methods)		
4.4	Training methodology (Module II Planning and Evaluation of Training Programmes)		
4.5	Effective staff selection		
4.6	Motivation and job satisfaction		
4.7	Interpersonal communication		
4.8	The supervisor as a trainer and instructor		
4.9	Groupwork and discussion leading		
4.10	Leadership and human relations (Basic)		
5.	Light industry service section		
5.1	Job simplification	5	200
5.2	Industrial safety I	4	160
5.3	Maintenance management	5	250
5.4	Industrial safety II	4	200
5.5	Stores and stock management	3	120
6.	Tourist industry section		
6.1	Supervisory hotel housekeeping	5	150
6.2	Front office procedures	5	150
6.3	Staff management in the hospitality industry	5	150
6.4	Institutional cooking and catering management	5	150
6.5	Marketing in the hospitality industry	5	150
6.6	Introduction to accounting in the hospitality industry	5	150

	Title	Duration Days	Cost M$
6.7	Leadership and customer relations	5	150
6.8	Restaurant services	5	150
6.9	Beverage management	3	90
6.10	Kitchen management	3	150
6.11	Hotel restaurant supervisory certificate course (9 modules)	23 March/ 24 June	1,035
7.	Industrial engineering section		
7.1	Organization and methods.	5	200
7.2	Filing and records management	3	120
7.3	Materials handling	5	250
7.4	Work study	5	250
7.5	Inventory management	5	-
7.6	Production planning and control	5	250
7.7	Low cost automation	2	200
7.8	Quality control	5	250
7.9	Critical path method	5	250
8.	Special programmes		
8.1	Human resources development programme	35	500
9.	Special programmes for the Malaysian Association of productivity (using guest speakers)		
9.1	Administration of organizational communication		
9.2	Management of organizational behaviour		
9.3	Office management		
9.4	Group dynamics		
9.5	Effective organization of office work		
9.6	Office methods improvement		
9.7	Organization and methods for management		
9.8	Office forms design and control		
9.9	Work simplification in the office		

These courses were available at a cost of M$240 for non MAP members and M$200 for all MAP members.

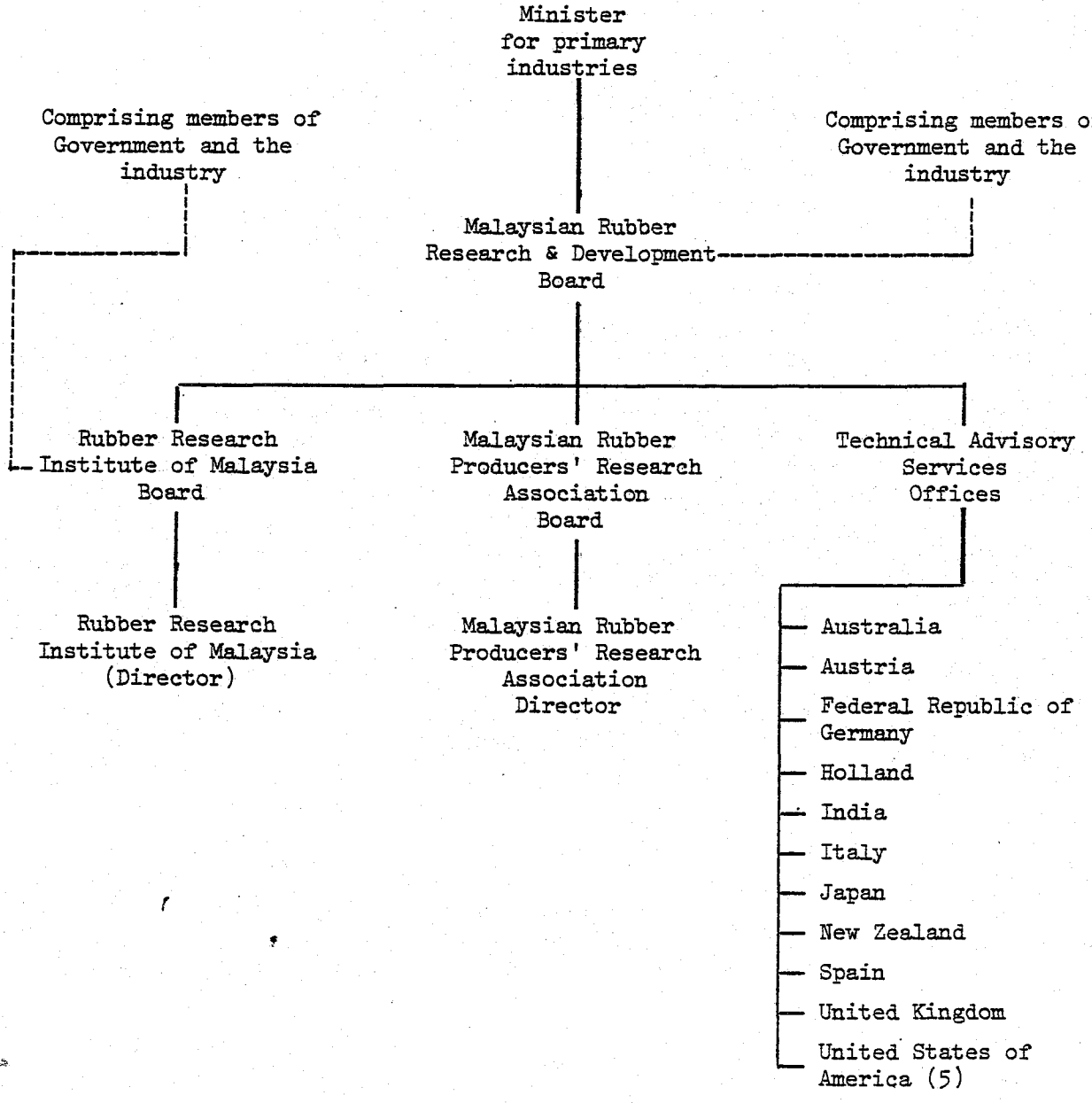
Note: a) Several of the courses listed in 1 to 8 inclusive were offered on more than one occasion.

b) Where no cost is given the course has usually been organized for a specific customer.

c) In addition several courses were also given in Bahasa Malaysia.

Annex XIV

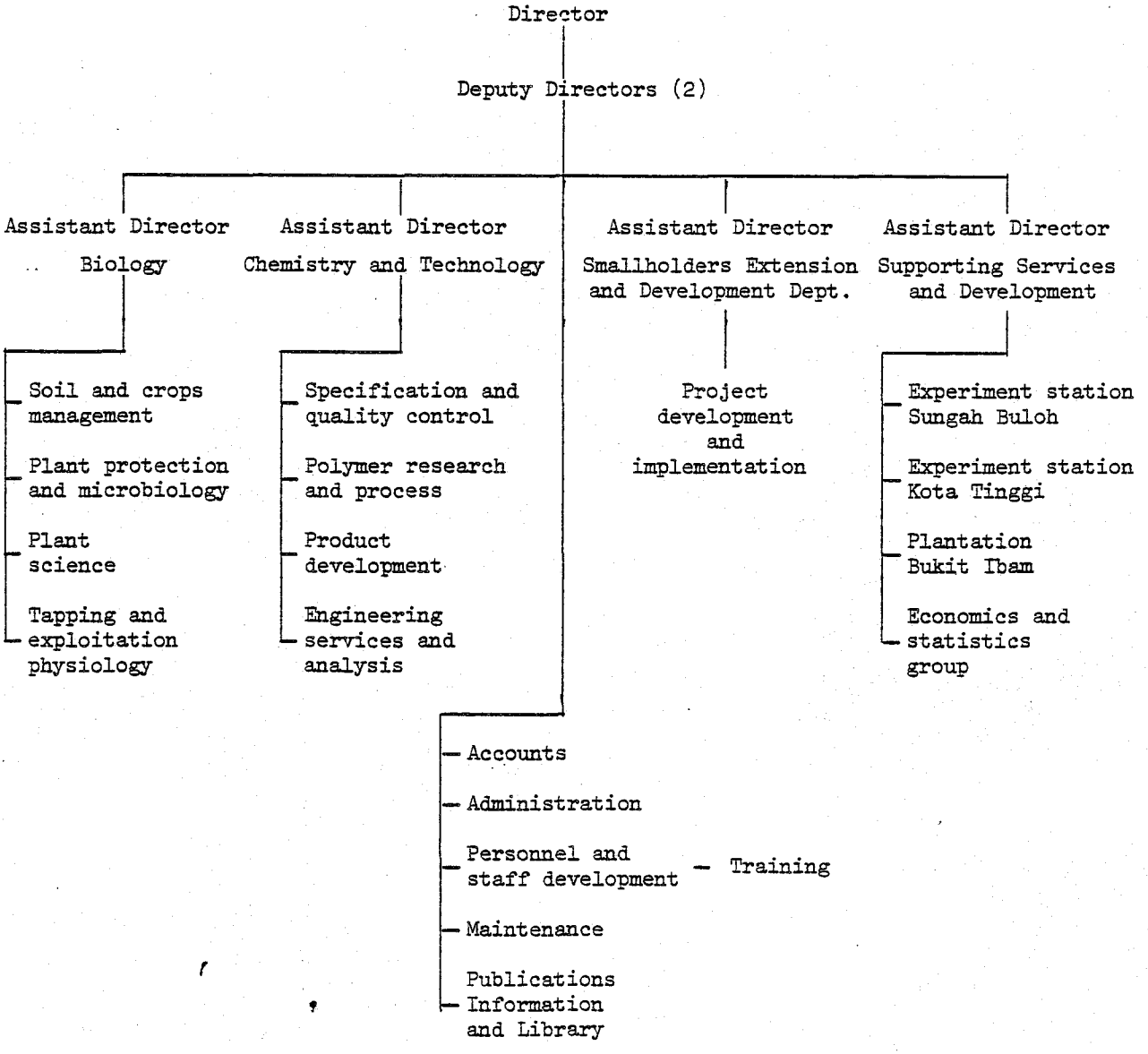
DEPENDENT RESEARCH AND DEVELOPMENT ORGANIZATION
OF MRRDB



NOTE: The Malaysian Rubber Producers' Research Association Board and the Malaysian Rubber Producers' Association are both located in the United Kingdom.

Annex XV

ORGANIZATION OF DIVISIONS IN RRIM



Annex XVI

ACTIVITIES OF SOME OF THE DIVISIONS OF RRIM

1. Plant Science Division: Breeding and selection, propagation and planting methods, exploitation methods (stimulation of the yield), physiological studies (prolongation of latex flow after tapping), plant hormones and growth.

2. Polymer research and process: Chemistry of rubber hydrocarbons, colloid chemistry of latex, dynamic properties of rubber, physics of solid rubber, modifications of rubber, free-flowing rubber.

3. Chemistry and technology: Analytical research, preservation systems, processing into latex concentrate, new processing methods, new rubbers, new applications and uses (rubber tree wood uses, rubber seed oil). Latex technology, rubber in engineering, production development and processing, test methods and specifications, technical advisory service, tyre development and testing service.

4. Smallholders projects research: Plantation practice, intercropping projects, agronomy projects, mixed farming projects, exploitation projects area development.

5. Soils and crop management: Soil studies (survey, mapping, classification and capability assessment of soils under rubber), crop management (nutrition of Heavea in relation to clone, stock/scion, growth rate, exploitation systems nutrient interactions), soil covers, weeds and fertilizers, soil conservation and improvement, soil and foliar nutrient survey, choice of planting materials.

6. Crop protection and microbiology: Diseases, pests, South American leaf blight, bacteriology of latex and coagulation utilizing bacterial action, economics of crop health and vigour, factory effluents.

7. Economics and statistics: Applied economics, resource allocation, processing and marketing, rural development, service to the industry statistics and data analyses, applied statistics and methodology, computer application.

8. Specifications and quality control: Technical administration (registration and licencing of standard Malaysian rubber /grading system/ factories), specifications and standard testing, quality control, advisory section, commercial testing.

9. Publications, library and information: Public relations, selection and acquisition of scientific material, library services, documentation and information, scientific and technical communication, printing and publishing, graphic and visual communication, technical vocabulary (translations), conferences and exhibitions.

Annex XVII

TRAINING COURSES OFFERED BY RRIM

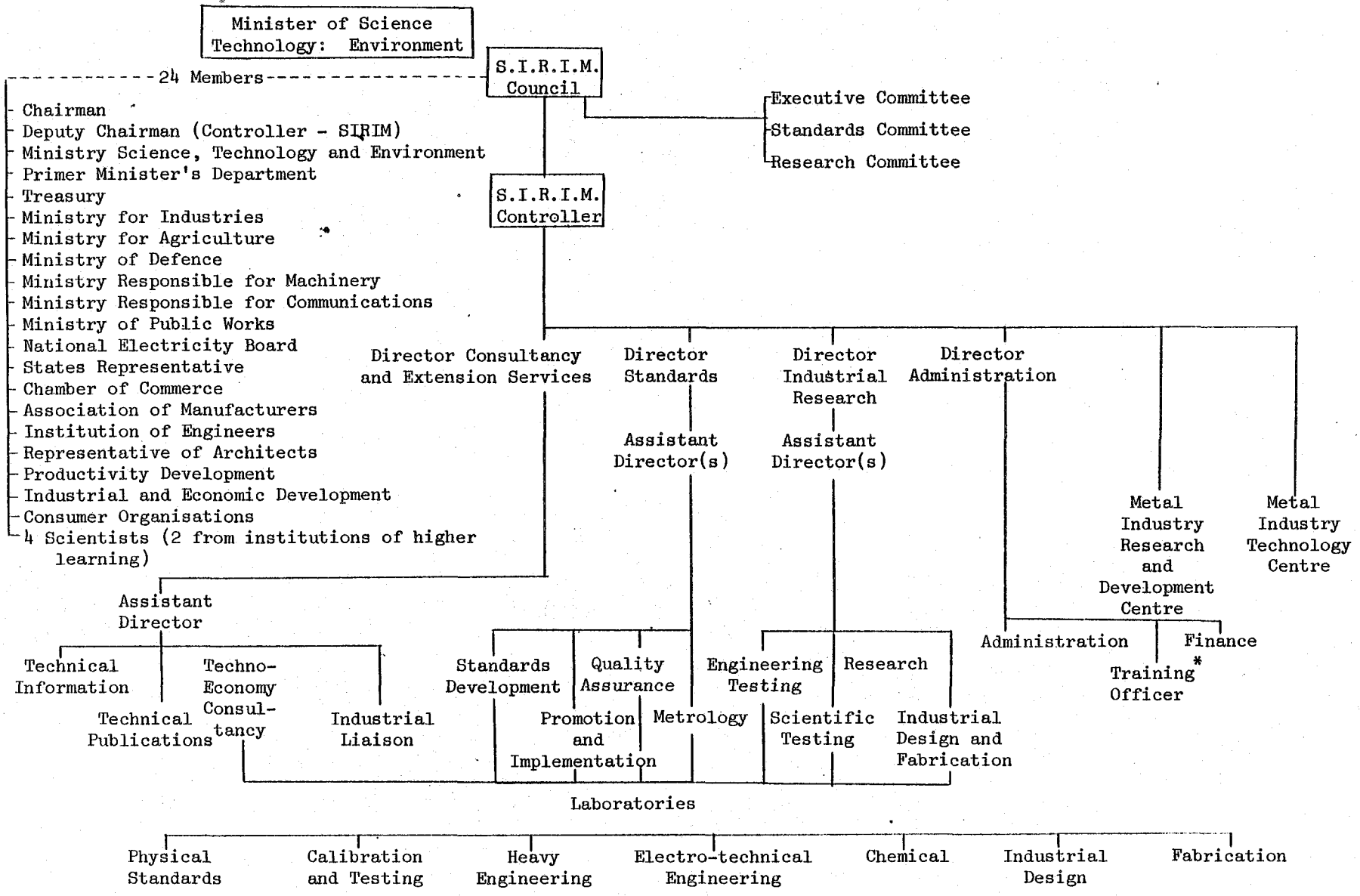
		Duration	
1.	Diploma in natural rubber processing	34 weeks	Intermediate and terminal examinations
2.	Rubber planting, management and processing	10 weeks	Terminal examination
3.	Soil and foliar analysis	(Lectures 1 week (Practical 4 weeks	Terminal examination
4.	Latex, rubber and effluent analysis	(Lectures 1 week (Practical 4 weeks	Terminal examination
5.	Natural rubber processing	1 week	Course evaluation only
6.	Soils, management of soil and nutrition of Hevea	1 week	Course evaluation only
7.	Crop protection and weed control in rubber plantations	1 week	Course evaluation only
8.	Tapping, tapping systems and yield stimulation of Hevea	1 week	Course evaluation only
9.	Rubber planting and nursery techniques	1 week	Course evaluation only
10.	Estate management and planning	1 week	Course evaluation only
11.	Course for estate supervisors	Practical field work	Certificate of attendance
12.	Correspondence course on rubber planting management and processing	26 weeks (2 weeks practical)	Practical and written examination
13.	Rubber processing machinery and maintenance	1 week	Certificate of attendance

Note: (a) Courses No. 6 to 10 inclusive are updating courses for estate executives.

(b) In addition to the above regular courses specially designed programmes will be arranged to suit the needs of overseas students sponsored by governments or companies. These ad hoc training programmes may vary from one week to one year.

(c) Training programmes of duration one week to six months will also be arranged for undergraduates of local institutions of higher learning to meet the requirements of their fields of study.

ORGANIZATION CHART FOR SIRIM



* Post vacant at 15 September 1981.

Annex XIX

TRAINING PROGRAMMES OF A.P.D.C.

1. Regional Workshop on Corporate Planning in Public Enterprises in Asia and the Pacific Region (Kuala Lumpur, 17-21 November 1980)

2. Regional Workshop on Curricula for Training Public Enterprise Managers in Asia and the Pacific (New Delhi, 9-30 March 1981)

3. Training Junior Managers in Public Enterprise Management (Manila, 11 March to 22 May 1981)

4. National Workshop on Planning, Budgeting, Accounting and Auditing (Kathmandu, 15 March to 14 April 1981)

5. Regional Programme on Administrative Planning and Implementation of Development Projects (New Delhi, 18 May to 19 June 1981)

6. Sub-Regional Workshop on Planning and Management of Rural Development Projects (Manila, 25 May to 19 June 1981)

7. Strategies for Integrating Women in the National Planning Process (Colombo, 1-19 June 1981)

8. Public Enterprise Management (Bangkok, August 1981)

9. Public Enterprise Management (Kathmandu, September 1981)

Annex XX

MEMBER COUNTRIES OF A.P.D.C. AND MANAGEMENT BOARD MEMBERS (August 1981)

1. Iran
2. Afghanistan
3. Pakistan
4. Maldives
5. India Vice-Chairman, Mr. P. Saranayagam
6. Nepal Mr. Narasinghe Narayan Singh, Member-Secretary, National Planning Commission
7. Sri Lanka Mr. W. M. P. B. Menikdiwela, Secretary to the President of Sri Lanka
8. Bhutan
9. Bangladesh Mr. M. Muhiuddin, Section Chief (Joint Secretary), External Resources Division, Ministry of Finance
10. Burma
11. Mongolian Peoples Republic Mr. Damiranjavyn Zagasbaldan, Chairman Central Statistical Office
12. China
13. Thailand Mr. Phaichitr Uathavikul, Deputy Minister for Finance
14. Malaysia Chairman, Dr. Elyas Omar, Deputy Director-General, Public Services Department
15. Lao Peoples Democratic Republic
16. Vietnam
17. Democratic Kampuchea
18. Singapore
19. Indonesia Mr. Adrianus Mooy, Deputy Chairman, National Development Planning Agency
20. Hong Kong
21. Brunei
22. Republic of the Philippines Mr. Filologo Pante Jr, President, Institute of Development Studies and Assistant Director-General of the National Economic and Development Authority

23. Republic of Korea Mr. Bak-Kwang Kang, Director-General, Atomic Energy Bureau, Ministry of Science and Technology

24. Australia Mr. P. J. Drake, Professor of Economics, University of New England

25. Japan Mr. Ryokichi Hirono, Professor of Economics, Seikei University

26. Papual New Guinea

27. T.T. of the Pacific Island

28. Solomon Islands

29. Nauru

30. Vanuatu

31. Republic of Kiribati

32. Tuvalu

33. Fiji Mr. G. B. Gris, Director, South Pacific Bureau for Economic Co-operation

34. New Zealand

35. Samoa

36. Niue

37. Tonga

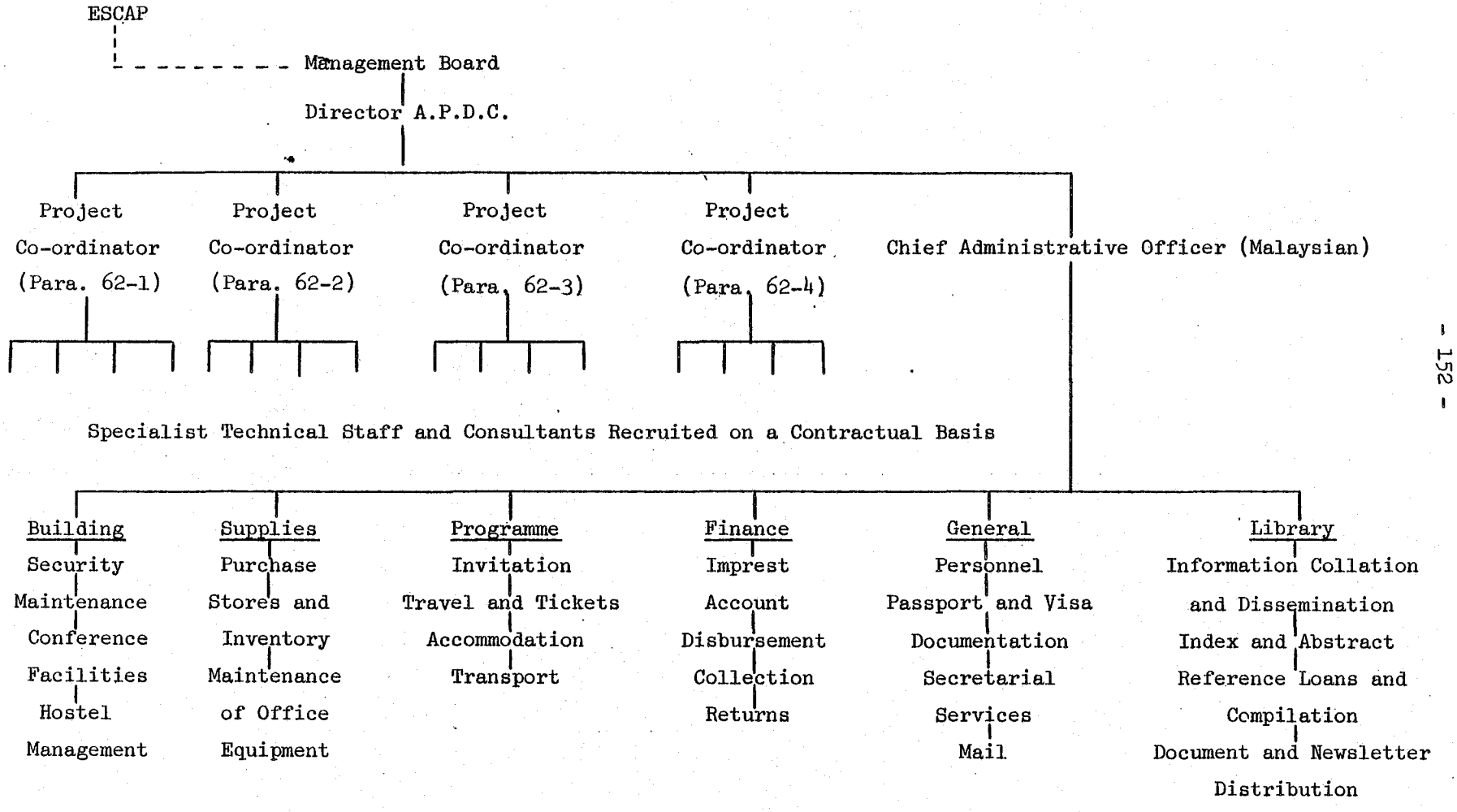
38. Cook Islands

Also Members of the Management Board:

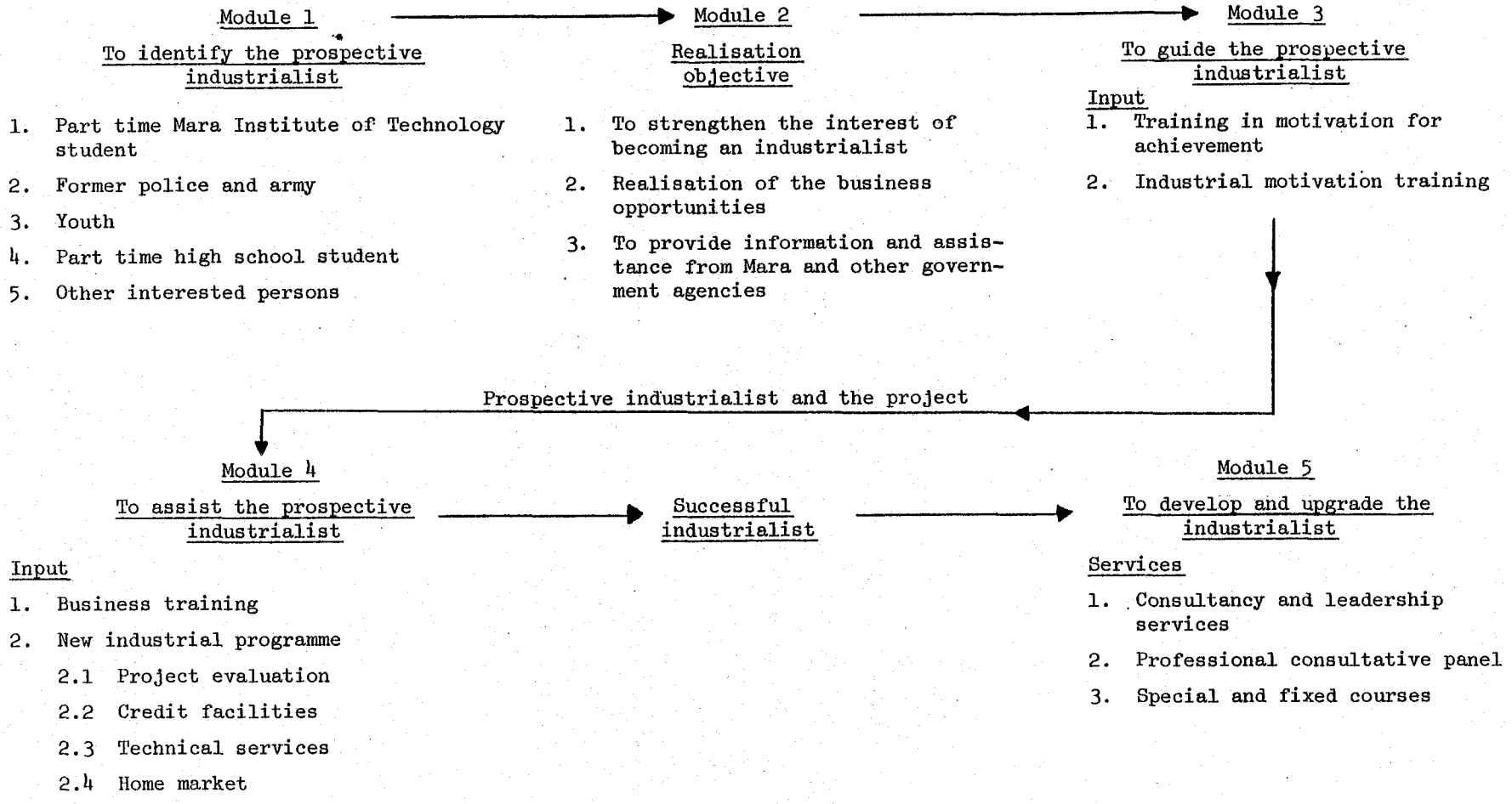
Mr. Aftab Ashad Khan*, Secretary, Director of A.P.D.C.
Mr. Xu Naijiong*, Director, Division of Development Administration T.C.D., United Nations, New York.

Note: There are 15 Management Board Members, 2* of whom do not represent a country.

ORGANISATION CHART A.P.D.C.



MARA. MODULAR TRAINING SCHEME - ENTREPRENEURS DEVELOPMENT DIVISION
(Translated from Bahasa Malaysia)



Annex XXIII

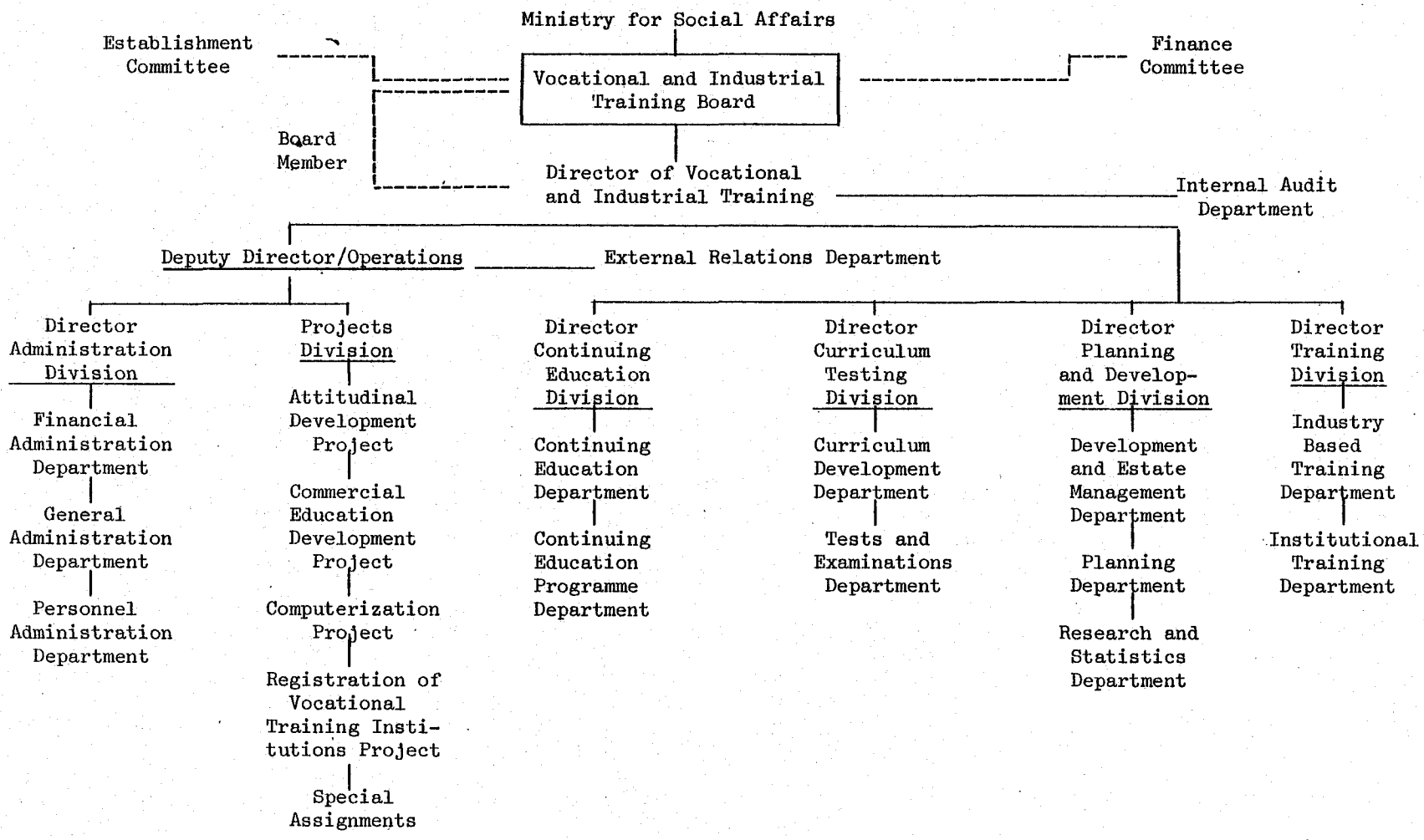
TRADE ADVISORY COMMITTEES OF THE V.I.T.B.

1. Applied Arts Trades
2. Automotive Trades
3. Commercial Education
4. Construction Trades .
5. Electrical Trades
6. Electronics Trades
7. Fashion Arts Trades
8. Hotel Trades
9. Mechanical Engineering Trades
10. Precision Engineering Trades
11. Printing Trades
12. Shipbuilding and Repair Trades
13. Wood-based Trades

Ad Hoc Committees

1. Hair Dressing
2. Mobile Crane Operators Training

VOCATIONAL AND INDUSTRIAL TRAINING - ORGANIZATION



The Technical Advisory Committees (para. 83) work in their respective trade areas with the appropriate departments.

Annex XXV

COURSES AND AWARDS AT SINGAPORE POLYTECHNIC

Course		Duration Years Full Time/Part Time	Technician Award
1.	Mechanical Engineering Technology	3/5	Diploma
2.	Civil Engineering Technology	3/5	Diploma
3.	Land Surveying Technology	-/4	Diploma
4.	Structural Engineering Technology	-/5	Diploma
5.	Electrical Engineering Technology	3/5	Diploma
6.	Chemical Process Technology	3/5	Diploma
7.	Production Engineering Technology	3/5	Diploma
8.	Building Technology	3/5	Diploma
9.	Marine Engineering	4/- a/	Diploma
10.	Electronics and Communications Engineering Technology	3/5	Diploma
11.	Architectural Draughtsmanship	2/3	Certificate
12.	Architectural Draughtsmanship	-/2 b/	Diploma
13.	Maritime Radiocommunications	2/- c/	Certificate
14.	Pre-Sea Induction Course for Deck Cadets	16 weeks full time d/	

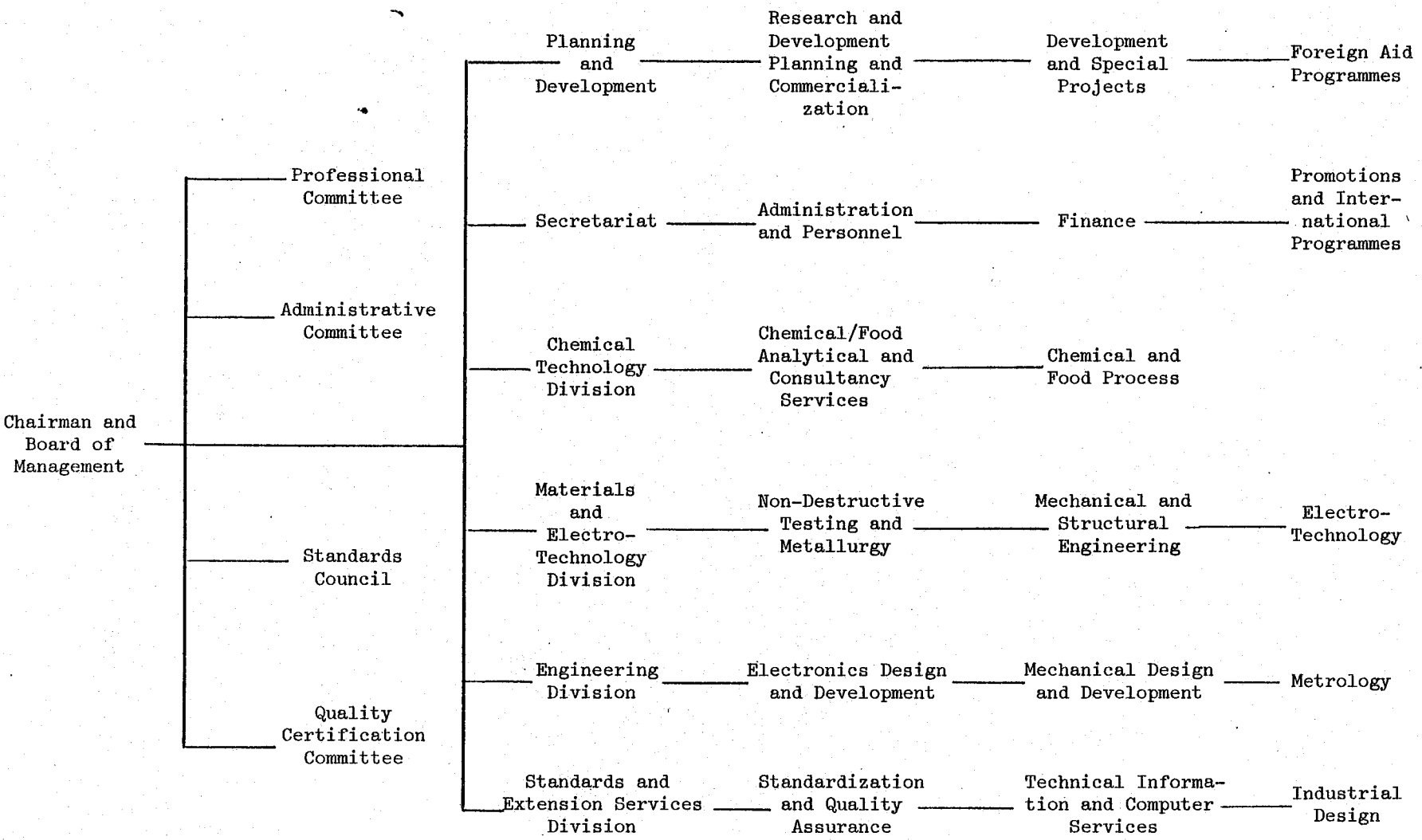
a/ Consisting of 2 years full time study at the Polytechnic
6 months workshop training in approved shipyards
6 months full time study at the Polytechnic
1 year sea training as cadet engineer with obligatory correspondence course. Diploma then gives exemption from part A of 2nd class engineering examination.

b/ Must be in relevant employment, recommended by employers and possess the Polytechnic Technician's Certificate in Architectural Draughtsmanship.

c/ The course prepares students for the Telecommunications Authority of Singapore examination for a Radiocommunication Operator General Certificate which is the only recognised certificate issued in Singapore qualifying the holder to take charge of ship's radio station.

d/ Prepares students to become deck cadets. Following the course, the student is required to serve two years at sea, during which he must complete a correspondence course conducted by the Department of Nautical Studies of Singapore Polytechnic. After completing the sea time the student must return to the Polytechnic for 2 terms to obtain a certificate of competency either as second-mate foreign-going or mate home-trade depending on the course followed in the 2 terms. The Department runs career advancement courses preparing students for the Marine Department's examinations as First Mate Foreign-going (20 weeks), Master Foreign-going (20 weeks), and Master Home-trade (12 weeks).

DEPARTMENTAL ORGANIZATION AT SINGAPORE INSTITUTE OF STANDARDS AND INDUSTRIAL RESEARCH



Annex XXVII

COURSES AVAILABLE AT THE SINGAPORE INSTITUTE OF MANAGEMENT

Course Title	Duration Hours	S$ Cost Member/Non-Member
1. Implementing NWC Recommendations through Performance Appraisal	21	400/460
2. Cash Flow Management	10	240/275
3. Business Negotiation	14	350/400
4. Professional Credit Management	21	660/720
5. Time Management for Senior Executives	14	300/350
6. The "Management Game" as a Training Tool	21	500/575
7. Using Films as a Training Tool	7	175/200
8. Systematic Layout Planning	21	
9. Improving Productivity - Methods Engineering and Work Measurement	21	400/450
10. Effective Sales Forecasting	7	120/160
11. The Job of the Chief Executive	(Residential - 6 days)	3 500/-
12. Inventory Management in the Computer Age	14	420/480
13. Production Control by Computer	14	420/480
14. Work Study for Improving Office Efficiency	21	220/260
15. Asian Association of Management Organisations' Course Leaders Course	(Residential - 6 days)	1 850/-
16. Creative Selling	14	220/250
17. The Secretary in Management Today	10	200/240
18. Tax Management	10	240/275
19. Finance for Non-Finance Managers	21	330/380
20. MTS Leadership Development Seminar	(Residential 5 days)	1 750/1 950
21. Kepner-Tregoe Programme on Managing the Performance System	21	850/1 000

Annex XXVII (cont'd)

Course Title	Duration Hours	S$-Cost-Member/Non-Member
22. Modern Techniques and Strategies for Management Problem Solving	21	265/295
23. Sales Strategy Workshop to Increase Market Share	21	650/710
24. Sales Management Workshop	21	750/810
25. Effective Physical Distribution Management	14	250/280
26. Materials Management	14	250/280
27. Where the Money Is and How to Get It	7	50/75
28. Motivational Selling Seminar	6	110/135
29. Application of Computers in Management	21	685/750
30. The Allen Management Seminar	35	1 400/1 600
31. Motivating Groups and Individuals - Theory and Practice	14	440/480
32. Selection Interview Workshop	14	440/480
33. Telephone Techniques and Courtesies	6	40/50
34. How to Prepare and Use Marketing Plans	21	650/750
35. Marketing for Accountants	14	450/550
36. Corporate Financial Management	21	650/750
37. Techniques for Planning and Control	14	450/520
38. Marketing for the Secretary	9	195/230
39. Diploma in Management Studies	2 years of evening study	2 600/-
40. Negotiating Profitable Sales	21	450/550
41. Work Measurement and Financial Incentive Schemes	21	220/260
42. Chairing Effective Meetings	14	300/350
43. Prospecting and Sales Techniques	21	450/550
44. Diploma in Marketing Management	1/	1 200/-
45. Diploma in Personnel Management	1/	1 200/-

1/ Programme of one year duration covering 2 semesters. It consists of 5 courses, 3 in the first semester and 2 in the second semester. Lectures for each subject taken will be held once a week (each lasting 3 hours).

Annex XXVII (cont'd)

Course Title	Duration Hours	S$ Cost Member/Non-Member
46. Marketing Strategies in a Rapidly Changing World Economy	17	1 200/1 400
47. Effective Business Writing Skills	10 evenings	210/240
48. Shaping Business Strategy in an International Environment	(Residential - 12 days)	5 250/5 850
49. Recruitment, Interviewing and Selection of New Employees	14	300/350
50. Kepner-Tregoe Associates Apex-Executive Problem Analysis and Decision Making	35	1 250/1 450
51. Delegation and Team Building Skills	14	300/350
52. S.I.M. Course Leaders' Course	(Residential - 6 days)	1 350/1 500
53. Strategic Planning	14	600/750
54. Consultancy Skills	35	2 500/3 000
55. Management Development Auditing	14	300/350
56. Effective Corporate Management for Small, Medium-sized Companies	7	450/520
57. Industrial and Technological Innovation and New Product Development	14	600/750
58. Training Programme for Training Officers	21	750/820
59. Appraisal and Disciplinary Interviewing Skills	14	300/350
60. The Art of Negotiating	14	1 000/1 2000
61. The Secretary in Management Today	9	200/240
62. Effective Team Building Techniques for Executives	21	265/295
63. Advanced Purchasing and Supply Workshop	35	1 000/1 200
64. Asian Executive Development Programme	(Residential - 17 days)	2 500/-
65. Improving Profit Through Better Cost Control	21	680/725
66. Financial Decision Making Using the Advanced Programmable Calculator	14	520/570

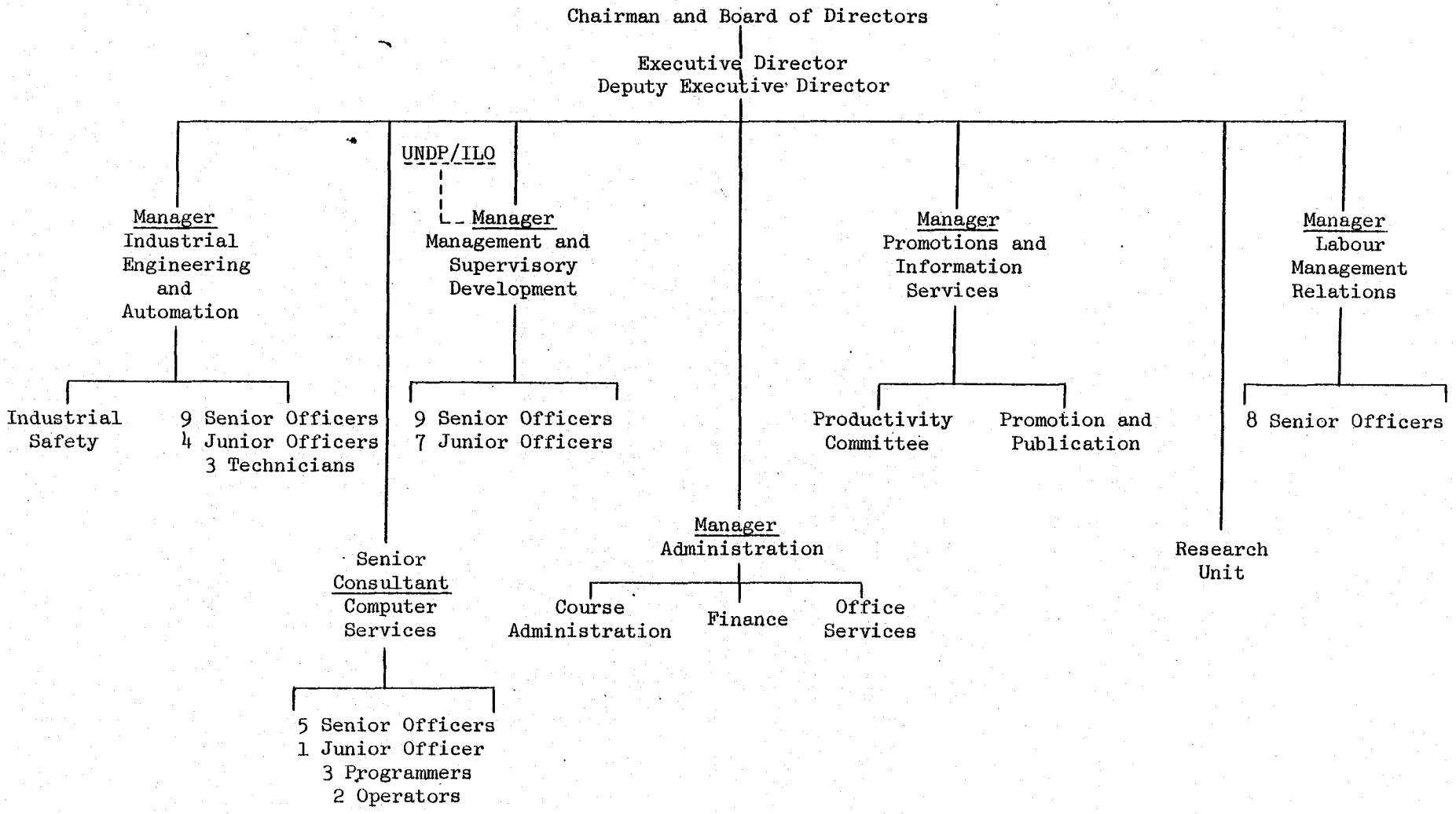
Annex XXVII (cont'd)

Course Title	Duration Hours	S$ Cost Member/Non-Member
67. How to Establish and Operate an In-Company Assessment Centre	35	1 850/2 150
68. How to Identify Managerial Temperaments using MBTI	14	475/525
69. Human Relation Training Laboratory	(Residential - 5 days)	1 850/2 100
70. The Ideal Tax Efficient Emolument Package	7	320/380
71. Saudi-Arabia and the Arabian Pensula: Challenge to Business Managers in East Asia	14	1 400/1 700
72. The Challenge to Succeed (video programme)	10	295/345
73. Decision Making	14	450/500
74. Management in Research and Development	21	795/915
75. Executive Development Course	28	1 000/1 200
76. Public Relations and Marketing for the Secretary	9	195/230
77. Time Management	7	300/350
78. Planning, Developing and Managing Profitable New Products	21	750/850
79. Focus on Sales	7	300/350
80. Tactics and Techniques for Effective Supervision	21	265/295
81. Managing Foreign Exchange	21	950/1 150
82. Systematic Storage Planning	21	600/700
83. How to Plan Factory and Office Layouts	21	600/700
84. A Day with Bill Reddin	7	300/350
85. The Top Team and Organisational Effectiveness	14	650/700
86. The Psychology of Winning (video programme)	10	295/345
87. Profitable Sales and Business Negotiation	21	650/750

Annex XXVII (cont'd)

Course Title	Duration Hours	S$ Cost Member/Non-Member
88. The Development and Operation of a Franchising System	14	650/750
89. Planning and Budgeting for Managers	14	210/240
90. Effective Team Building for Supervisors	21	265/295
91. Certified Diploma in Accounting and Finance	-	1 000/1 200

BRIEF ORGANIZATIONAL CHART OF NATIONAL PRODUCTIVITY BOARD OCTOBER 1981



Annex XXIX

COURSES OFFERED BY THE NATIONAL PRODUCTIVITY BOARD

Course Title			Duration Hours
1.	Top Management Development Programme [1]	(5 one week modules, day + evening)	
	1.1. Module I	Accounting and Budgetary Control	48
	1.2. Module II	Marketing Management, Decision Science and the Manager	48
	1.3. Module III	Managing People in Organisations/ Human Resources Management	48
	1.4. Module IV	Managerial Economics/Financial Management	48
	1.5. Module V	Business Policy and Strategy/ Corporate Planning	48
2.	Executive Development Programmes		
	Programme I Business Management (7 Modules)		
	2.1. Module I	General Management	30
	2.2. Module II	Personnel Management	20
	2.3. Module III	Management Accounting and Finance	30
	2.4. Module IV	Production Management	20
	2.5. Module V	Marketing Management	20
	2.6. Module VI	Data Processing and Management Information Systems	20
	2.7. Module VII	Taxation and the Legal Framework of Business	20
	Programme II Personnel Management (5 Modules)		
	2.8. Module I	Manpower Planning and Personnel Selection	30
	2.9. Module II	Local Labour Laws	30
	2.10. Module III	Wage and Salary Administration	40
	2.11. Module IV	Performance Appraisal	30
	2.12. Module V	Industrial Relations and Collective Agreements	20
	Programme III Management Accounting and Finance (7 Modules)		
	2.13. Module I	Financial Analysis	20
	2.14. Module II	Financing Your Business	15

1/ Offered in conjunction with the Graduate School of Business, University of Chicago. Successful completion qualifies for Diploma in Management Studies jointly issued by the University and the National Productivity Board.

Course Title		Duration Hours
Programme III Management Accounting and Finance (7 Modules) (cont'd)		
2.15. Module III	Budgeting and Budgetary Control	20
2.16. Module IV	Working Capital Management	20
2.17. Module V	Cost Accounting and Control	30
2.18. Module VI	Costing for Management	20
2.19. Module VII	Capital Investment Analysis	15
Programme IV Marketing and Sales Management (6 Modules)		
2.20. Module I	Marketing Policy and Strategic Planning	30
2.21. Module II	Marketing Research	20
2.22. Module III	Advertising, Public Relations and Sale Promotion	20
2.23. Module IV	Sales Management	20
2.24. Module V	Export Marketing	20
2.25. Module VIa	Financial Planning for Marketing Activities, or	
2.25. Module VIb	Professional Salesmanship	20
3. Other Management Courses		
3.1.	How to Use Statistics in Industry	16
3.2.	How to Identify and Develop Management Potential in Your Organisation	20
3.3.	Active Performance Appraisal	20
3.4.	Incentive Schemes	10
3.5.	Plant Layout and Materials Handling	20
3.6.	Plant Maintenance	20
3.7.	Improve Product Quality Through QC Techniques	20
3.8.	Store Management	20
3.9.	Productivity Measurement	20
3.10.	Project Management for the Construction Industry	20
3.11.	Materials Requirements Planning for the Manufacturing Organisation	10
3.12.	Practical Training in Time Study	10

Annex XXIX (cont'd)

Course Title			Duration Hours
3.	Other Management Courses (cont'd)		
	3.13.	A Basic Course in Production Planning and Control	20
	3.14.	Job Evaluation	10
	3.15.	The Ergonomics Approach to Improving Work Performance	20
	NPB Certificate in Production Management (5 Modules)		
	3.16. Module I	Methods Improvement and Industrial Safety	-
	3.17. Module II	Work Measurement and Incentive Schemes	-
	3.18. Module III	Quality Control	-
	3.19. Module IV	Production Planning and Control	-
	3.20. Module V	Plant Maintenance/Personnel Management for Supervisors	-
	NPB Certificate in Management Services (3 Modules)		
	3.21. Module I	Method Study	70
	3.22. Module II	Foundation Studies	70
	3.23. Module III	Work Quantification	70
	NPB Certificate in Organisation and Management of Maintenance System (3 Parts)		
	3.24. Part I	Maintenance and Profitability, Objectives and Policies, Maintenance Plan and Resources	
	3.25. Part II	Trainee Prepares a Paper on His Own Plant, Production/Maintenance/Problems	
	3.26. Part III	Monitoring Techniques, Crack/Leakage Detection, Temperature/Vibration Measurement Lubrication Selection	
	NPB Certificate Course in Office Management (4 Modules)		
	3.27. Module I	Approach to Office Administration, and Organisation and Methods	-
	3.28. Module II	Office Systems and Mechanisation	-
	3.29. Module III	People and Organisation	-
	3.30. Module IV	Business Communication	-

Annex XXIX (cont'd)

Course Title			Duration Hours
4.	Supervisory Development Programme (5 Modules) - TOTAL		131
4.1.	Module I	Training within Industry for Supervisors	
4.2.	Module II	The Supervisor and His Role	
4.3.	Module III	Elements of Industrial Engineering	
4.4.	Module IV	Personnel Management for Supervisors	
4.5.	Module V	Cost Accounting and Control for Supervisors	
5.	Computer Training Programmes		
	NPB Certificate in Computer Programming (2 Parts)		
5.1.	Programming Background, Cobal Programming, Basic Programming		50
5.2.	Programming Techniques and Assembler Programming		60
	NPB Certificate in Computer Data Processing (5 Modules)		
5.3.	Module I	Computer Programming and File Processing	50
5.4.	Module II	Systems Analysis and Design	50
5.5.	Module III	Computer Applications in Accounting/ Finance	30
5.6.	Module IV	Management Information Systems	30
5.7.	Module V	Computer Management	30
5.8.	Systems Analysis (NCC Training Library)		-
6.	Technology Training Courses		
6.1.	Industrial Injection Moulding		20
6.2.	Decoration and Assembling of Plastics		20
6.3.	Welding Technology		20
6.4.	Metallic Corrosion - Its Causes and Prevention		
6.5.	Basic Industrial Hydraulics		24
6.6.	Industrial Motors - Maintenance and Applications		20
6.7.	Industrial SCR Control for Electric Motors		20
6.8.	Industrial Hydraulics		25

Annex XXIX (cont'd)

Course Title	Duration Hours
6. Technology Training Courses (cont'd)	
6.8. Industrial Hydraulics	25
6.9. Advanced Course in Microprocessors P Module II (6800)	25
6.10. Advanced Course in Microprocessors P Module II (Z80)	25
6.11. Basic Industrial Pneumatics	30
6.12. Advanced Industrial Pneumatics	12
6.13. Understanding Transistor Circuits	10
6.14. Mechanisation of Production Processes	24
6.15. Practical Jig and Fixture Design	20
6.16. Practical Die Design for Presswork	16
6.17. Injection Mould Design	20
6.18. How to Improve Machine Tool Accuracy	20
6.19. Low Cost Automation for the Furniture Industry	20
6.20. Plastic Materials and Additives	20
6.21. Operation and Maintenance of Boilers	30
6.22. Industrial Heat Treatment of Ferrous Metals	20
6.23. Air Conditioning and Refrigeration	20
Inudstrial Control	
6.24. Module I Basic	20
6.25. Module II Advanced	20
Digital Electronics	
6.26. Module I Integrated Circuits	16
6.27. Module II Integrated Circuits	16
Basic Course in Microprocessors (3 Modules) - TOTAL	20
6.28. Module I Intel 8080A	
6.29. Module II Motorola 6800	
6.30. Module III Zilog Z80	

Course Title	Duration Hours
6. (cont'd)	
Advanced Courses in Microprocessors	
6.31. Module IV Interface	25
6.32. Module V Interface and Application	25
6.33. Industrial Hydraulics	28
7. Industrial Safety and Health Training Courses	
7.1. Safety Officers Training Course	100
7.2. Industrial Safety for Managers	20
7.3. Shipyard Safety Instruction Course for Managers and Executives	26
7.4. Shipyard Safety Instruction Course for Supervisors	26
7.5. Building Construction Safety Supervisors Course	26
7.6. Safety in Petrochemical Plant Operations	7

Note: The course durations may vary slightly from those listed which are based on the assumption that every session occupies 2 hours, where in some cases a session may be 2.1/2 hours.

PROPOSALS FOR IMPROVEMENTS OF TRAINING SCHOOLS

Rubber Research Institute of Malaysia

OBJECTIVES

The framework for the development of future training programmes for the natural rubber industry can be linked to national objectives for the next decade : firstly, expansion of rubber production from present levels of 1.6 million tonnes to 3.3 million tonnes by 1990 and secondly expansion of rubber manufactures from 60,000 tonnes to 300,000 tonnes.

It is clear that the expansion of the industry will embrace all local sectors, including government, private estate and smallholder, while foreign organisations can be expected to participate in the manufacture of rubber articles in joint ventures.

In particular the smallholders sector accounting for an increasingly large share of rubber production in the country is bereft of technological innovation and change due to ineffective transfer and assimilation of technological benefits and a lack of organised marketing facilities. Unless more success can be achieved by concentrated efforts in dissemination of research results to smallholders and relating research to smallholders problems, all plans and schemes, however dynamic for increasing productivity in the smallholders sector will be nullified.

The rubber manufacturing sector is however, not without its problems. The majority of the factories are still using low cost and out-dated equipments e.g. 80% of local manufacturers still adopt the two-roll mill as their single means of mixing. The industry is still lacking in quality control facilities and proper house specifications. Many of the factories have not as yet acquired the ability to keep abreast of modern trends in product design, machinery and technological practice. Lack of in-house research and development facilities and modern export marketing know-how have tended to inhibit growth and expansion.

TRAINING PROGRAMMES

The existing training programme for the Diploma of Natural Rubber Processing caters mainly for Standard Malaysian Rubber grades and latex concentrate which together account for about half the raw rubber produced in this country (800,000 tonnes per annum). There is little emphasis on RSS, the other half of all the rubber produced and on rubber product manufacture, which is still in its infancy.

Three areas can thus be targetted for development incorporating the following:-

I Course on RSS production

II Course on rubber-based product manufacturing technology

III Improvements to existing facilities

I. RSS Production Training

Introduction

Although RSS is the major grade exported from this country, with 800,000 tonnes annually compared to 550,000 tonnes for SMR, little has been achieved to date to improve its quality since its inception more than 80 years ago, and today most of our production is still in the form of low quality sheets mainly from smallholders that sell at a discount. It is therefore not surprising that research and development effort is now revamped towards the smallholder rubber sector to redress its many shortcomings.

There is thus a need to widen the scope of training programmes conducted by the RRIM to encompass RSS production technology in greater perspective rather than solely the SMR sector. One way of achieving this object would be to integrate the RSS programme with the Diploma of NR Processing Course, which has obvious advantages over the alternative of providing training solely on RSS, except as a short refresher course for candidates already familiar with methods of block rubber production.

A comprehensive course on NR Processing technology will equip personnel not just with modern methods of making top quality RSS, but also on modern process for SMR and other specialty grades and thus leave them better prepared for future development in this technologically changing era.

Course Detail

Venue:

RRIES would be ideal considering the existing training facilities available there: lecture hall, laboratory, hostel and training staff. The following facilities which are not available at present will also be required: mini RSS factory comprising of coagulating tanks, mangles, sheeting battery, smokehouse and packing shed.

Deration:

(i) Three weeks inclusive of lectures and practical work, if separately organised.

(ii) If course is integrated with the P.I. Course, the duration would be about 42 weeks.

Syllabus

Introduction	No.of hours
Malaysian and World NR production. General statistics. Technically classifies rubber and RSS rubber Uses and consumers' preference.	2
Objectives of the course with emphasis on RSS production Duration of the course - lectures cum practical work with more emphasis on practical work and an end of course evaluation test and gradings given for practical work. Details of practical work. Job specification and grouping.	

	No. of hours.
Basic Science	
Importance of DRC determination of latex by hydrometer or metrolac, and Chee methods. Problems and difficulties encountered in the field and remedial measures taken. Preparation of solutions ÷ latex/water, stock solution of anti-coagulants and coagulants, calculation of chemicals additions to latices of different DRCs, understanding of PH, etc.	2 - 3
Preservatives	
Composition and nature of NR latex, colloidal stability, preservation, hygiene, adulteration.	2
Collection and Reception	
Collecting stations, methods of transportation cleaning.	2
Construction of Factory or Group Processing Centre	
Factors affecting size and site. Layout design and construction.	2
RSS Processing	
Latex handling, straining, standardisation and bulking, coagulation tanks, coagulation. Milling, sheeting batteries and mangles.	2
Smoking	
Methods of operating and design of subur and RRIM types: loading temp. control, ventilation, adjustments, start-up, firing and maintenance.	2
Baling and Packing	
Removal of dirt, wet spots, etc. Grading, baling, wrapping and talcing, including construction of baling press.	2

Accounts

	No. of hours
Record-keeping: rubber, chemicals cash, profit and loss account, balance-sheet. Types of costs, cost allocation cost control, efficiency. Labour laws and industrial safety. Organisation of group processing centres.	2

Factory Management

Responsibilities of supervisors, man-power, job planning, recruitment, work measurement and methods to improve efficiency. Labour laws and industrial safety. Organisation of group processing centres.	8

Marketing

Individual sales, group sales, price calculation, government duties and cesses.	10
Export of NR, shipping documents, bill of lading insurance, letter of credit, agency houses.	

PRACTICAL WORK

1. Field Tapping and latex collection. Use of latex preservatives.
2. Determination of D.R.C. by metrolac and Chee methods. Comparison with 15.0 DRC.
3. Processing of field latex into RSS following closely the technique of processing
4. Smoking the sheet rubber. Temperature control of smokehouse and proper recording of temperature. Loading and unloading of RSS.
5. Visual grading of smoked sheet and conduct sales of RSS.
6. Field trips to RSS factories, GPC and packers.

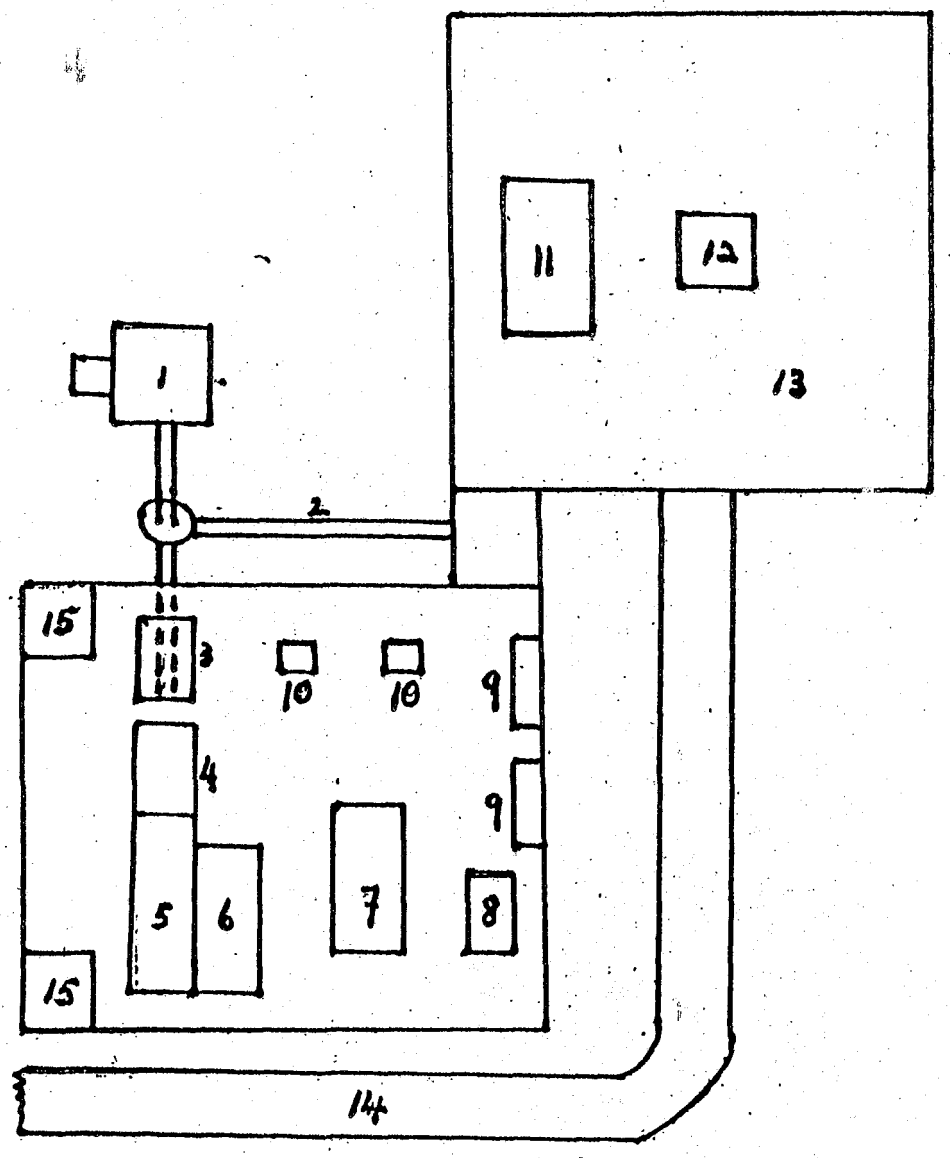
Group Discussion

	No. of hours
Selected topics (three sessions)	6
Total (excluding practicals)	42

Detail of Capital Estimate (See Figure 1.)

Item	Number	Approx. cost US $
Main factory, 120M^2	1	20,000
Al coagulation tanks, 500 litres	1	2,000
Al coagulation pan, 5 litres	30	500
Tables, 1M x 2M	4	400
Shelf	2	300
Al chute, 4M	1	200
Sheeting battery	1	15,000
Mangles	2	500
Trolley, 100 kg	1	1,000
Smokehouse, 100 kg	1	5,000
Packing shed, 100M^2	1	15,000
Rails, 30M	1	300
Road, 200M^2	1	1,500
Fence, 200M	1	1,500
Contingency		20,000
	TOTAL	83,200

A 25% allowance has been made for contigency in this estimate. (an increase of $26,000 over the previous estimate).



1. Smoke House
2. Rail
3. Trolley
4. Sheeting battery
5. Chute
6. Coagulation tank
7. Work bench
8. Demonstrators table
9. Shelf
10. Mangles
11. Sorting table
12. Baling press
13. Storage area
14. Road
15. Toilet

Figure 1: RSS Processing Laboratory

11. Rubber - Based Product Manufacturing - Technological Training

In 1979, there were just over 120 registered rubber product manufacturers consuming some 50,000 tons metric of Natural Rubber which employed about 20,000 staff. With the industrys' growth rate of 10% per annum the consumption of NR is expected to 300,000 tons metric by the year 1990.

One of the current problems faced by the industry is lack of trained personnel/staff specially at ground level/supporting staff to be engaged in implementation of good factory housekeeping, quality control and some R & D activities, product design and process control. The training program would be highly beneficial to small scale manufacturers who represent 80% of the sector, since they do not have proper facilities for staff training programme.

The RRIM would be ideal for conducting the technology course, with its R & D infra-structure, highly trained staff and availability of equipment provided training facilities available at the present training school are expanded. These would include a technology laboratory with basic equipment complementing those available at the technology research centre.

Course Programme

The course on rubber product manufacturing technology and the Diploma of Natural Rubber Processing Course (including RSS) can be conducted in separate modules, with the option of attending either or both.

The duration of the course would be about 18 weeks inclusive of a two week factory attachment, which is calculated from the following basis on the assumption of 6-hr day:-

Total lecture period	-	330 hrs
Total practical period	-	150 hrs
TOTAL		480 hrs

Course Lecture	No. hrs
1. Mixing & mastication general	3
2. Types of processing machine 2-roll mills, internal mixers, external mixers	15
3. Processing techniques/behaviour, viscosity & scorch optimum cure, density, swell, tack, compounding.	6
4. Types of rubbers - NR & synthetic	10
5. Fillers - black & non-black	10
6. Compounding ingredient - accelerators, antioxidant, processing aides, antiozonant, blowing agent, retarders, etc.	30
7. Compound designs related to product design & manufacture	17
8. Vulcanisations Simple theory	6
9. Types of curing systems - sulphur, peroxide, urethane, etc.	17
10. Technology of reclaim rubber (a) Chemical methods - dry - wet (b) Physical methods - cryogenic	10
11. Quality control Mooney viscosity, Rheometry, Instron capillary extrudation, Brabendon Plastometer, Wallace Plastimeter	15
12. Testing of products. Tensometer, abrasion, hardness, wodulus, resillience, flex, O-ring fatigue, goodrich flexometry, etc.	25
13. Latex production manufacturing latex, compounding, prevulcanised latex, dipping batch process continuous and automatic plant, balloons, gloves, condoms, tubings, catheters, teats. Latex extrusion - latex thread, latex tubing, foams, moulded & carpet backing.	25
14. Intergrated rubber production & manufacture (a) carbon black masterbatching (b) Silica, clay, zinc oxide (c) intergrated custom compounding (d) dipping plant for manufacture - latex concentrate plant intergration (e) downstream manufacture	15

15. Product design & manufacture processes 25
Compression moulding, transfer moulding, injection moulding, simple mould design for each mode, calendering and spreading hot and cold feed extrusions continuous vulcanisation LCM, micro-wave

16. Product Manufacture
Hose, mining & braided types; tyres & retreads, V-belt, 25
Tank lining, cut thread, footwear, laminated mountings moulded goods, belting, rubber band, inner tubes, seal-rings seal-rings.

17. Factory practices
Description of mechanical features of machine and 40
lay out plan of equipments, including consideration of design, metals used, lubrication system, types of drives of mixing machinery, calenders, spreading and dipping machines. Factors governing the choices of mould metals, Workshop processes as used in mould making including hobbing, sprak erosion, precision casting and convention machinery, Basic elements of extruder screw and die characteristics.

18. Safety, health aspects & toxicity of rubber chemicals 10

19. Role & Functions of Technology Centre 6

20. Role & Function of TAS case studies 9

(a)
i. cassette roller studies
ii. rice husk roller
iii. bicycle tyre
iv. braider hose
v. cutless bearings

21. (b) Panel Discussion 11

i. role of quality control in rubber product mfr.- a passport to export

ii. Role of a consortium/grouping of small scale manufacturers - taking as a national marketing agent for export of rubber products

22. Practical (some experiments) at Technology Centre 150 hrs

(a) mixing & compounding
(b) extrusion - rod & hose
(c) calendering
(d) variation of mooney scorch with curing systems
(e) variation of density & hardness with filler at fixed phr.
(f) related to (d), variation of mooney scorch with rheometer scorch & effect of high temps.
(g) variation of tensile properties and resilience in (e)
(h) variation of thickness in dipped film with drc
(i) simple dwell time experiment
(j) akron abresion & skid resistance of (e)
(k) tensile properties of films prepared in (h)
(l) simple cord adhesion or rubber-metal bonding using mixes in (e)
(m) determination of filler dispersion using TEMSCAN

(n) Fracture behaviour of wear/abraded surfaces by TEMSCAN
(o) Intersurface adhesion between tyre cordds (steel, polyester, etc) and rubber.

equivalent to 10 wk (afternoon 1.30 - 4.30)

23. 2 week assignment to a rubber manufacture Co.

(i) Fung Keong
(ii) Far East Prod. Mfr.
(iii) Linatex
(iv) Heveafil
(v) Dunlop, Goodyear, IT International
(vi) Plaat
(vii) Central Elastic
(viii) Euromedical
(ix) Dunlop foam
(x) Autoway
(xi) LRC
(xii) Karya

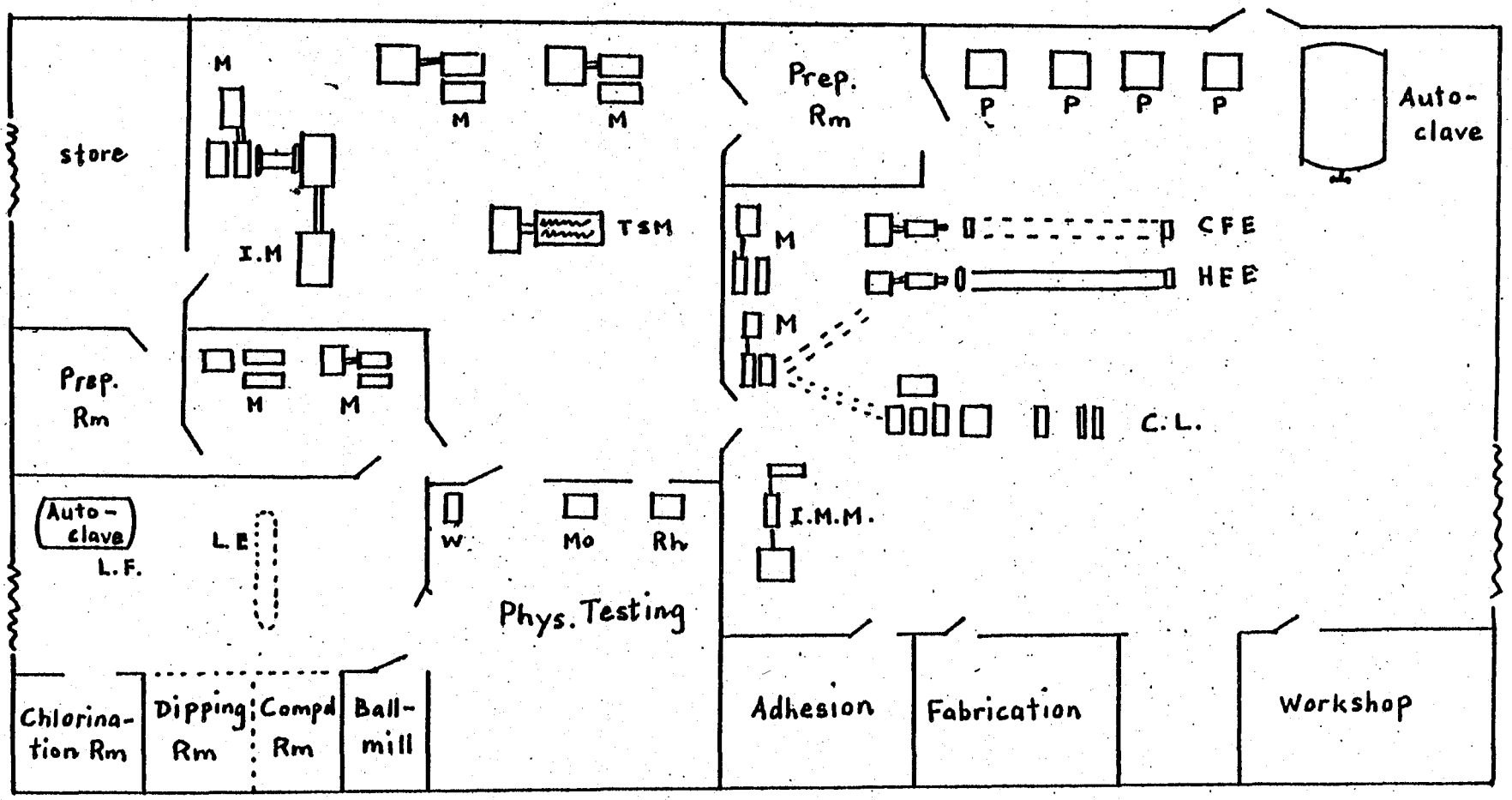
Proposed Rubber Laboratory Facilities

Physical Testing Lab Equipments	Quantity	Approx. Cost in US $
24. Instron Tensometer (8000 series with computer read-out)	1	200,000
Die cutter	1	200
Compression set Jig	10	2,000
Tension set Jig	1	200
Dunlop tripsometer	1	20,000
Wallace Plastimeter	1	20,000
Shore durometer	2	10,000
IRHD Hardness meter	2	500
Mooney viscometer	1	500
Monsanto rheometer	1	20,000
Ageing Oven	5	10,200
Electronic weighing balance	2	1,500
Densitometer	1	2,500
Mod tester (MR 100)	2	2,000
Lovibond coloue tester	1	2,000
Ring fatigue equipment	1	20,000
Akron abrader	1	15,000
Din abrader	1	15,000
Thickness gauge	2	1,000
Foam testing equipment - Hampden indentometer	1	10,000
Freezer (-40°C)	1	600
Inflamability test equipment	1	20,000
Scientific calculators	3	750
X-Y chart recorder	1	1,500
X-t chart recorder	2	3,000
Vacuum pump and vacuum line (set)	1	10,000
High temp. oil batch	2	5,000
	C/F	393,250

Accessories for tensometer			Approx. cost in US $
		B/F	393,250
Tensile grip			1,000
Tyre cord adhesion			1,000
Adhesive tape peel test			5,000
latex thread testing equipment - Schwars tester			15,000
25. Latex Technology	Quantity		
A small autoclave	1		20,000
Stirrers	4		10,000
Sbiverson mixer/stirrer	2		10,000
Ball-mill & mill-pots	1		10,000
Dipping plant (batch-mix)	1		10,000
Ovens	4		20,000
Dryer for dipping	1		10,000
Hot water baths	3		10,000
Latex tube extrusion	1		10,000
Chlorination unit	1		10,000
MST m/c	2		10,000
PH meter	2		6,000
Brockfield viscometer	2		10,000
Homogeniser	1		5,000
26. A small maintenance/service workshop Mechanical			
Small lathe	1		15,000
Small milling machine	1		20,000
Shaping machine	1		75,000
Drilling equipment	1		10,000
Welding arc equipment	1		5,000
Electrical/electric			
Universal meter	2		10,000
Oscillographic unit	1		10,000
Soldering equipment	2		10,000
		C/F	721,250

Rubber Technology Laboratory (see figure 2)	Quantity	Approx. cost in US $
		B/F 721,250
1. Internal mixer 5 litre capacity with conveyor belt and 2-roll mill	1	150,000
2. 12" x 24" 2 roll mill	2	30,000
3. 16" x 40" 2 roll mill	4	150,000
4. Twin screw mixer	1	200,000
5. 24" x 24" 2 daylight press 100 ton	3	100,000
6. 24" x 24" electric pressure	1	50,000
7. Cold feed extruder 3"	1	100,000
8. Hot feed extruder 3"	1	100,000
9. 12" x 24" calender line	1	200,000
10. Smallest Rep injection moulding machine	1	100,000
11. 6 ft autoclave	1	25,000
12. Boiler	1	40,000
13. Compressor unit	2	20,000
14. Inner tube splicers	1	75,000
15. Tyre component services	-	20,000
16. Thermoplastic injection moulding machine	1	75,000
Civil works		
Laboratory building (15,000 sq ft)		300,000
	Total	2,456,250

Figure 2 LAYOUT PROPOSED TECHNOLOGY LABORATORY



M 2- roll mill
P press
I.M. Internal mixer
T.S.M. Twin Screw mixer
C.F.E. Cold Feed extruder
H.F.E. Hot Feed extruder
I.M.M. Injection Moulding machine
C.L. Calender line
L.E. Latex extrusion
L.F. Latex foam
W Wallace Plastometer
Mo Mooney viscometer
Rh Rheometer

III. Improvements to Existing Facilities

A. NR Processing School

1. Laboratory

The present SMR laboratory originally designed for 30 trainees was not expanded when the hostel facilities and lecture hall were in 1965 to accomodate 50 trainees, and is now very congested during the practical periods. A 25 feet extension is proposed to ease congestion and to accomodate the Monsanto rheometer for a newly included SMR specification test. Other items for the laboratory include one air conditioner, one oven, one exhaust fan and an Apex press. Details of laboratory modifications are given below in *Figure 3*.

2. Library

The present library is poorly stocked. At least 200 books on rubber technology and sciences would be required to bring it to a satisfactory standard.

3. Hostel

Four double rooms and a bathroom can be constructed if the present covered open space beside the lecture hall is utilised.

4. Bungalow

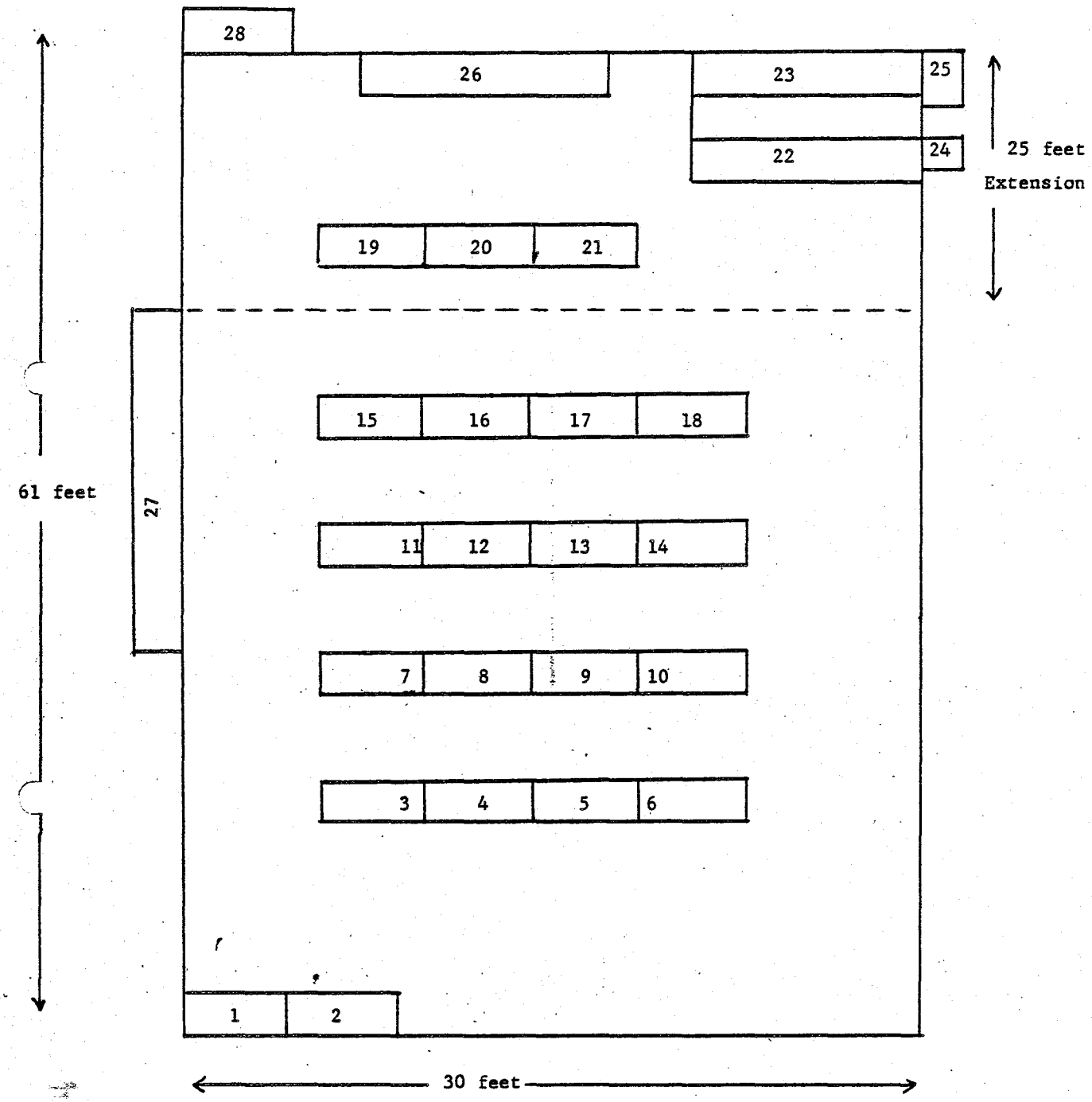
A hostel warden/lecturer post is essential for supervision of laboratory work and student's affairs after normal office hours for which provision for a bungalow is made.

The layout of the proposed extension to the NR Processing School is given in *Figure 4*.

Details of Estimated Costs

	Approx. US $
Laboratory extension, including workbenches	50,000
Monsanto rheometer	25,000
Air conditioner	1,000
PRI Oven	2,000
Apex Press	5,500
Exhaust fan (chemical resistant)	5,000
Library shelves	1,500
Books	5,000
Hostel : 4 rooms + 1 bathroom (extension of present hostel)	20,000
Bungalow for hostel warden	100,000
TOTAL	216,500

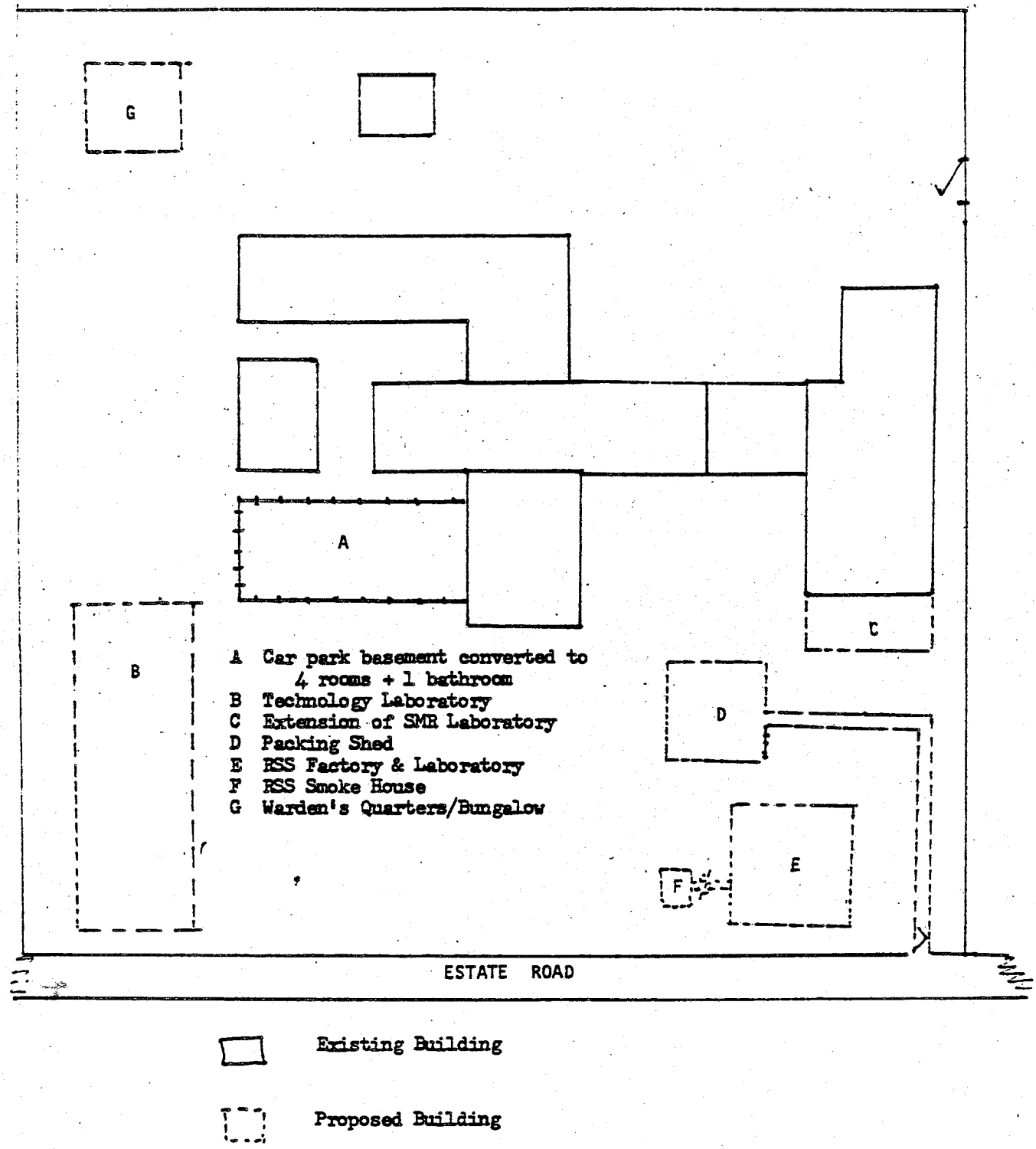
FIGURE 3 : LAYOUT OF PROPOSED P.I. SCHOOL LABORATORY



Key to the Proposed P.I. School Laboratory

1, 2, 3	Blending mills and table
4	Chemical preparations
5	DRC, TD, NH_3, Steam bath
6	DRC, TS, NH_3, Steam bath
7	VFA, N_2
8	VFA, N_2
9	BOD
10	BOD
11	RHC
12	RHC
13	Acetone Extraction
14	Acetone Extraction
15	Chemistry Experiments
16	Chemistry Experiments
17	Physics Experiments
18	Physics Experiments
19	Dirt
20	Ash
21	Colour
22	Monsanto rheometer, Mooney Viscometer
23	Balances
24	Compressor
25	Air conditioner
26	Apex press
27	Nitrogen Digestor, Ash Oven
28	Dirt heaters

Figure 4 LAYOUT OF PROPOSED EXTENSION TO N.R. PROCESSING SCHOOL



III. (B) Natural Rubber Training School

This school is sited about 200 metres from the Natural Rubber Processing School at the Experiment Station, Sungei Buloh. It is used to conduct the three-month introductory Course on NR production, management and processing to train school leavers and junior staff of the various rubber organisations. The medium of instruction is Bahasa Malaysia.

The school consists of a lecture room, a six-room hostel which has been used to accommodate up to 30 trainees, a dining room and a kitchen. The fact that five persons sharing a double room and one attached bathroom leaves much to be desired. Therefore, the hostel is in real need to extend the accommodation facilities to relieve the present cramped situation. The proposal to construct an additional eight double rooms to house 16 trainees while reducing the number of occupants in the existing rooms will help to improve living condition. The layout of the proposed and tension is given in *Figure 5*, and details of estimated costs are given below:-

Details of estimated cost		US $
8 rooms total area 1152 sq.ft	-	28,800
8 bathroom total area 512 sq.ft	-	12,800
Furnishings (beds, mattress, tables, chairs lighting, fans, wiring)	-	7,300
TOTAL		48,900

SUMMARY ON ESTIMATED COSTS

		Approx. cost US $
I	RSS Production Course	83,200.00
II	Rubber Based Product Manufacturing Technology Course	2,456,250.00
III	Improvements to Existing Facilities	
	(a) NR Processing Course	216,500.00
	(b) NR Training Course	48,900.00
	GRAND TOTAL	2,804,850.00

Figure 5 LAYOUT OF PROPOSED EXTENSION TO N.R. TRAINING SCHOOL