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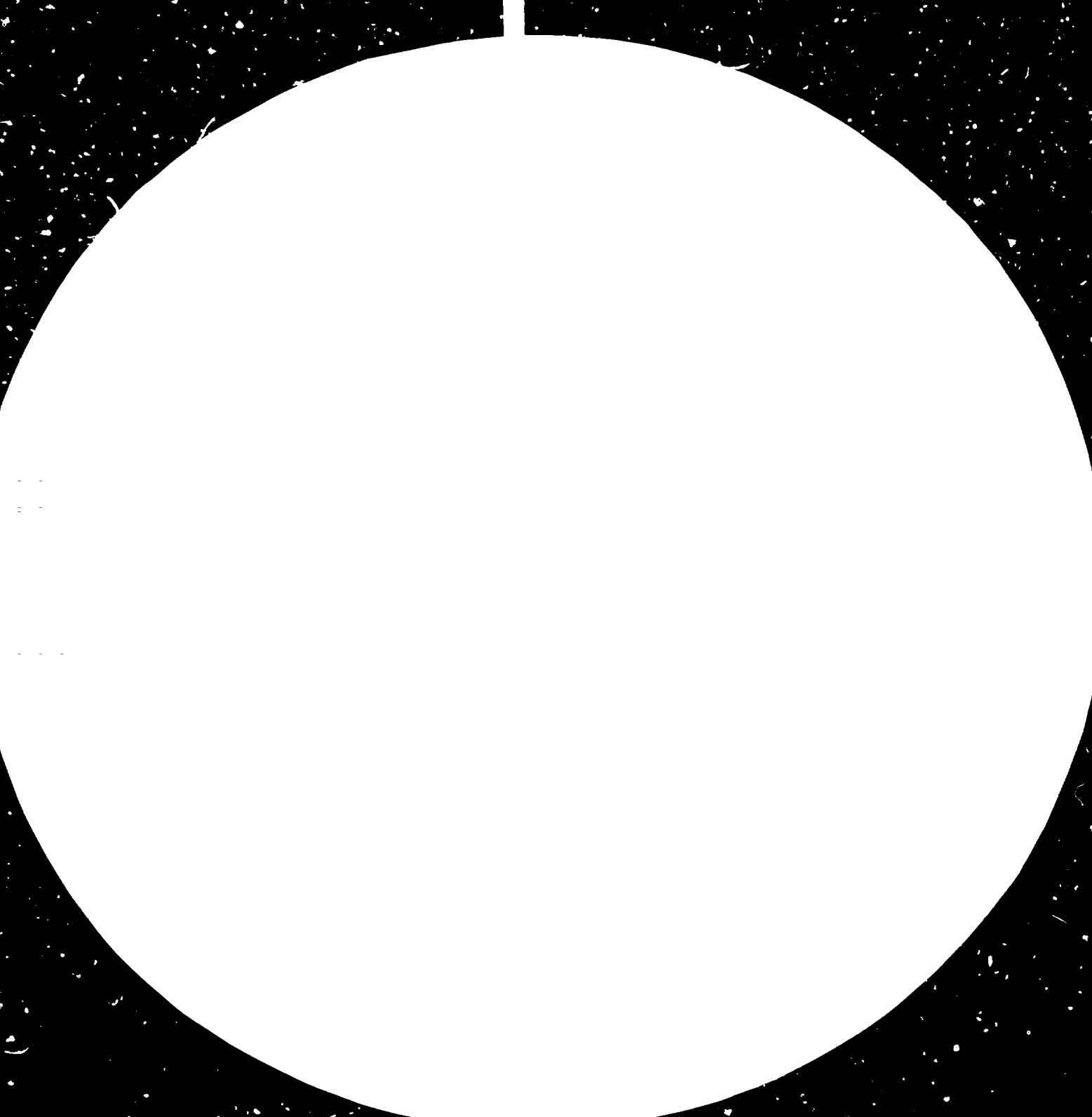
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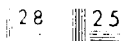
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UNITED NATIONS INDUSTRIAL
DEVELOPMENT ORGANIZATION

ENGLISH

ASSISTANCE TO THE NATIONAL COMMITTEE
FOR TECHNOLOGY TRANSFER
UNITED REPUBLIC OF CAMEROON

Final Report *

Prepared by the
UNIDO TECHNOLOGY PROGRAMME

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ENGLISH ONLY

ASSISTANCE TO THE NATIONAL COMMITTEE FOR
TECHNOLOGY TRANSFER
UNITED REPUBLIC OF CAMEROON
Final report

Corrigendum

Page 67

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Chargé d'Etudes à la DGRST Secrétariat CNTT

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I. Summary

One of the high priorities of the Cameroon Government has been to ensure the generation of more employment opportunities and an equitable distribution of income through the stimulation of industrial growth. Cameroon's favourable industrial climate, coupled with its liberal investment code, protection by substantial import duties, availability of a large and cheap labour force, inexpensive hydro-electric power and a relatively well-functioning physical and institutional infrastructure all contributed to the emergence of a significant number of import-substitution industries in the 1960s, most of which were foreign-owned. The dominant role of foreign ownership is reflected in the fact that expatriates tend to dominate high-level management and technical positions and even many of the middle-level supervisory positions, and this in turn has had a negative effect in respect of national acquisition of skills, techniques and know-how as well as local control of the nation's resources and its economy.

The Government has therefore taken new steps to develop and strengthen its indigenous technological capability in order to hasten the process of local technology development and application as well as the transfer, adaptation and absorption of imported technology. This is seen as the single most important step in the overall programme of industrial diversification, know-how acquisition and assimilation as well as technological self-reliance.

This Report, prepared by the United Nations Industrial Development Organization (UNIDO) as part of its assistance to the National Committee for Technology Transfer and the Délégation Générale a la Recherche Scientifique et Technique (DGRST), reviews and summarizes the present status of the Cameroonian industrial and technological scene, and attempts to put forward a number of proposals and recommendations that could form the basis for an overall technology policy and plan for the country. The Report is based on available government documents plus discussions and consultations with relevant national authorities and UNIDO consultants: Dr. Sang Joon Hahn, formerly Chairman of the Korea Institute of Science and Technology (KIST) and presently President of the Korea Institute of Electronics Technology (KIET), and Mr. Ho-Il Lee, Techno-Economic Analyst at the Korea Institute of Electronics Technology.

The Report specifically recommends a separate legal structure for the registration of technology contracts and agreements (and separate from the Investment Code), a financial mechanism for research activities, and the establishment of two new entities: a National Office for Technology Transfer (N.O.T.T.) and a Cameroon Institute of Industrial Research, Consultancy and Technology Transfer (CIIRCTT).

The main rationale for the above recommendations is to give a broader scope of discretion to the people and organizations working for research and technology development than under the existing system, which is similar to that of most of the developing countries. The Government of Cameroon has the development objectives of improving the standard of living and creating employment opportunities, as is generally the case in most developing countries. A technology development system to support the industrial development objectives of the Cameroon Government is now on the stage of formulation. At this point, it is desirable that a sharply-focused and strong start be formulated to directly link the development objectives with the industrial technology development system, not as a supporter, but as a leader for economic development through the alternative policies suggested in this report.

The Report also suggests administrative, legislative and financial frameworks for the establishment of the NOTT and the CIIRCTT, the former for the promotion and regulation of technology into the Cameroon economy, and the latter for the development and application of technology, the acquisition and adaptation of foreign technology and the training of industrial managers.

Overseas training programmes are recommended for some key personnel of the CIIRCTT in the fields of technology management, legal aspects of technology evaluation, project management, testing laboratory and machine shop, technology economics and technology information. It is recommended that these training programmes be conducted with the aid of international organizations such as UNIDO and UNDP. It is further recommended that the CIIRCTT should undertake a detailed survey of each industrial sector. Such a survey would lead to a better formulation of research and technology policy by the Government, and will assist in orienting the activities of CIIRCTT as the promotion vehicle for industrial and technological research in Cameroon.

II. Introduction

As a result of the present economic expansion taking place in Cameroon, the industrial sector and industrial activities in general are undergoing rapid development and expansion. This industrialization effort often involves the large importation of technology, some of which may not be particularly suited to the needs and overall development goals of the country. The Government has therefore established a machinery - a National Committee for Technology Transfer that would regulate, promote and coordinate the selection, acquisition, adaptation, transfer and effective utilization of foreign technology, and the development and commercialization of local indigenous technology to meet the socio-economic needs of the country.

At the request of the Government, UNIDO, through the services of two experts from the Republic of Korea, assisted the Secretariat of the National Committee for Technology Transfer in the crystallization of its functions and the development of an approach for the elaboration of a national technology programme. The "Terms of Reference" of the UNIDO assistance as well as the UNIDO experts included the following:

- 1) To discuss with government authorities on the development objectives and current critical areas of concern in the agricultural and industrial production structure.
- 2) To study the existing state of technology research and development facilities.
- 3) To review and propose alternative technology policies in relation to government objectives, natural and human resources.
- 4) To elaborate a national plan and programme of action including juridical, administrative, financial and institutional mechanisms to promote the development, acquisition and transfer of appropriate technology to and within the country.
- 5) To identify technical assistance and cooperation projects in the fields of development and transfer of appropriate technology.
- 6) To organize a national seminar on technology development and transfer.

With regards to items (6) above, the one-week national technology workshop which was attended by representatives of all sectors of the economy permitted the exchange of views on various technology proposals and recommendations and refined them for submission to the appropriate national decision makers. The Report of the Workshop is attached as appendix (F) of the report.

In order to make meaningful suggestions for the alternative technology policies which are contained in this final report, the UNIDO experts visited various representatives of the Cameroon industry, education/research institutes, and government authorities (see appendix D) for the purpose of identifying significant aspects of the technology policies of the country. The experts also reviewed various government documents to obtain further information on the science and technology development system in Cameroon. The project was executed in the field in close co-operation with representatives of General Delegation for Scientific and Technical Research (DGRST), the National Committee for Technology Transfer (NCTT), the Ministry of Economic Affairs and Planning, and the United Nations Development Programme (UNDP) Field Office in Yaounde, Cameroon.

III. Development Objectives of Cameroon Government and Its Current
Critical Concern in Agricultural and Industrial Sectors

a) General Aspects of Economic Development

The United Republic of Cameroon occupies an area of 475,442 sq.km. in West-central Africa, and has a population estimated to be 7.9 million (1977 estimate). About 80% of the population lives in rural areas and is engaged in agricultural production.

The country's economy has been favored by a number of natural advantages: an extensive territory with a wide range of climate and soils that permits production of a diversity of export crops, and a sizable population, a significant portion of which possesses relatively dynamic commercial skills and attitudes. By the time of independence in 1960 Cameroon already had acquired, at least in the southern parts of the country, a relatively advanced level of popular education, some railroad and road infrastructure, and a head-start on foreign investment in commerce and in a few industrial units.

With over 7.9 million in population (1977), a GDP of \$2,009 million in 1974/75, a per capita GDP of about \$300 a relatively diversified production pattern, and an increase of over 60% in constant price GDP from 199,000 million francs, CFA in 1965/66 to about 295,000 million in 1974/75, Cameroon appears to possess a significant degree of economic viability and potential for expansion. It already ranks as one of the economically more advanced of the developing countries of Africa. Moreover, the authorities have made relatively skillful use of existing advantages to achieve a favorable rate of economic growth without creating an inflationary climate or incurring an insurmountable burden of external debt.

The structure of economic activity is relatively well balanced. An estimated 34 % of GDP in 1975 consisted of income from the rural sector (agriculture, forestry, and fisheries). Another 30% came from the commercial sector, while manufacturing and mining accounted for 13% of the GDP.

Between 1970 and 1975, Cameroon's economy experienced a relatively slow rate of growth, with an average of only 2.4% of GDP increase per year in real terms. The value of foreign trade, however, increased at a rate of 11-13 per cent year since 1960 - though the country consistently suffered from balance of trade deficits.

During that period, the total value of exports rose from 57 billion franc CFA to 113 billion francs CFA (US\$500 million) in current prices, while the value of imports increased from 72 billion francs CFA to 127 billion francs CFA (US\$558 million). Thus the balance of trade deficit reached 14 billion FCA (US\$57 million) in 1975. This deficit resulted in part from the accelerated pace of industrial growth since 1964, necessitating the importation of large and expensive machinery, equipment and services.

b) Agricultural Development

About 35 per cent of Cameroon's GDP is derived from agriculture, fishing, and forestry, and about 75 per cent of the population are engaged in these sectors. Primary agricultural and forest products made up almost 90 per cent of 1977 exports of 173,850 million francs CFA, including semi-processed form such as cocoa by-products, cocoa, coffee and logs accounted for close to 66 per cent of total exports, with cotton, rubber, oilseeds and bananas also significant. At least 40 per cent of sectoral output is exported.

The 60 per cent consumed locally consists primarily of foodstuffs consumed without further processing and, to a small extent, inputs into agricultural processing such as palm oil, consumer manufacturing such as textiles and cigaretts, or construction material such as lumber. It is estimated that 20-25 per cent of food production is marketed, and the balance is consumed by the growers. Most agricultural export production is dominated by small-scale Cameroon farmers, with the exception of rubber. Timber production has been rising, as have exports of logs, but the timber production field remains dominated by large foreign firms.

Food and beverage imports at 12,5000 million francs CFA in 1976 were dominated by sugar, rice, wheat, and amenity products for upper-income urban markets. Substantial efforts are being made to expand rice and sugar production.

Among the constraints encountered in agricultural production are the prevalence of traditional holdings, the ageing of plantations and inadequate or non-existence of extension services. Nevertheless, agricultural production is deemed to be the highest priority sector in Cameroon in order to meet national needs of restricting imports of foodstuff and to furnish existing or future local industries with the inputs necessary for their development.

The government effort to develop agriculture has been concentrated on changes in production techniques and increased output. The priority of government development action is to encourage:

- the establishment and extension of large-scale modern plantation and agro-industrial complexes where local products can be processed;
- the development of small-scale family undertaking through the active promotion of the green revolution, with a view to guaranteeing satisfactory food supplies for the population, increasing income through the cultivation of export crops, and developing markets for garden and fruit crops.

In general, due to a lack of basic infrastructure such as access roads, power supply facilities, lack of skilled manpower and equipment and, more significantly, the small size of the farms, etc., rural agriculture faces difficulties in further development. This, perhaps, explains the tendency of the youth to migrate from rural into urban areas where more opportunities exist.

c) Industrial Development

Industry and power amount to about 13 per cent of the GDP. Thanks to the industrialization effort of the Cameroon Government and the inflow of foreign capital, domestic industrial production

is capable of meeting almost 50 per cent of the manufactured goods demand.

The Government has given priority to industrial development aimed at national and regional markets as a means of accelerating growth. To achieve this purpose, extensive tax and financing incentives have been made available.

Industrial areas made a substantial effort to create employment - in line with the Government's investment policy. This led to over 5,000 jobs being created, mostly for technicians as well as skilled and unskilled labor. It is, however, clearly understood that unless a policy of developing local resources is adopted, the industrial sector will make only marginal contribution to employment.

Cameroon industry is, however, not deeply integrated into the economic structure, and provides very limited linkage effect. As a result, its growth is dependent either on primary export expansion or growth of foreign-financed investment activity in other sectors.

In spite of the numerous advantageous conditions existing in the country such as solar energy, adequate favorable temperature, adequate water resources in many regions and the possibility of continuous cultivation throughout the year, the land and natural resources have not been fully tapped for the best interest of the country.

Even some of the modern industries created, most of which are joint-ventures with government participation, have not been able to contribute effectively to the promotion of the national economy. Reasons and possible explanations include the absence of a concerted effort to build a national technological capacity, including industrial management capability; the absence of a sectoral and sub-sectoral planning strategy, including inter-sectoral linkages; the non-existence of a master plan for integrating industrial development with agriculture and other national development priorities and objectives. Industrialization has most frequently involved the importation of capital goods funded with foreign loans, and having no direct bearing, impact or multiplying effect on the rest of the economy. Moreover, the imported technology itself was not the know-how of any specific production process

as patent, but simple technical knowledge needed in the operation of industrial plants imported and built on a turn-key basis. Most importantly, the top management positions of these industrial ventures are occupied by expatriates whose sole concern is profit-making without any regard for overall national development goals.

The Government, fortunately, has come to discover the weaknesses with the present set-up, and is working towards redressing the situation. The formation of a National Committee for Technology Transfer, with the responsibility of co-ordinating all national action in the development, acquisition, and application of industrial technology, is an important step in this direction. The Government has, in addition, established development objectives aimed at raising the income level and standard of living of the entire population, with particular emphasis on the rural areas, where the majority of the population lives. The Government has, in the process, identified critical areas of concern in the agricultural and industrial sectors. These include:

- the fight against the rural exodus of the youth;
- the setting up of a reasonable infrastructure in rural areas, such as cooperative organizations for the guidance of the farmer, the distribution of fertilizers and chemicals, the collection marketing and distribution of products, extension services; physical facilities such as access roads, low-cost storage facilities, land reforming for mechanization and other amenities so as to make life more attractive in the rural areas;
- the promotion of incentive's and motivation among farmers; subsidization of fertilizers, price boost for farm products, etc.
- the proper use of fertilizers and chemicals for increased production;
- development of low-cost preservation methods of crop products;
- the setting-up of an adequate communication and transport network;
- the promotion of small and medium-sized industries manageable by Cameroonians in order to provide more employment opportunities;
- the training of a skilled and adequate industrial manpower;
- the setting up of an appropriate scientific infrastructure in order to get Cameroonian scientists involved in the process of modernization;

- the promotion of the transfer of technologies appropriate for the processing of indigenous raw materials, and their adaptation to local conditions;
- the promotion of the basic and common supporting facilities and skills required for this adaptation of technologies.

IV. Research and Technology Development Activities and Facilities in Cameroon and the Problems Associated

Cameroon has embarked on an ambitious programme for the development of research and technology activities. This programme includes the establishment of such indigenous enterprises and institutions as the Ecole Polytechnique, IRAF (Institute of Agricultural and Forestry Research), CENEEMA (Centre for Experimentation and Exploitation of Agricultural Machinery), the CDC (Cameroon Development Corporation) - to cite just a few. The activities of these institutions and enterprises are all the more laudable as they are often carried out with limited means and inadequate facilities, and should therefore be encouraged.

As evidence that the Government is determined to push ahead with its industrial and technological research activities and programmes, the status of ONAREST (National Office for Scientific and Technological Research), which is the umbrella organization that co-ordinates all scientific and technological research activities in the country, has been elevated to a General Delegation, under the supervision of a Delegate General with cabinet rank.

A) Research Activities in Academic Institutions:

The Example of the Ecole Polytechnique

At the Polytechnic Institute a number of research teams have been constituted, although one is quick to note the absence of local qualified staff to guide some of the research activities. The most structural team is the one in Electronics. The Physics team comes in second, and seems to have high potential to carry-out successful and meaningful research. Other research teams exist but, as already mentioned, more needs to be done to increase the number of local staff participation. Notable among the on-going research activities being carried out are the following:

- the study of the propagation of waves (5MHZ, 15MHZ) at the level of the magnetic equator. The facilities are workable.
- Electronic instrumentation research in the field of medical electronics. This research may ultimately upgrade local instrumentation technology. Thus, the processing of a pletismograph is well advanced.
- Analog and digital processing of signals; numeric simulation of converters is already under operation.

- A solar energy power station is contemplated.
- Energy efficiency study in aluminium metallurgy.
- Research on soil mechanics (especially on the mechanical properties of laterites) and soil reinforcement studies will contribute to the effective development of technologies applicable to indigenous material utilization.
- Energy source exploitation endeavours such as a biogas project for the construction of digesters, an experimental facility for solar drying, and power supply in rural areas.

On the basis of the existing facilities, one notes that general equipment, including testing, chemical analysis, and measuring facilities are lacking or inadequate. Encouragement, in the form of providing these services, is greatly needed.

B) Research Activities in Government Research Institutes and other Institutions

Besides academic institutions, research activities have also been carried out in various Government research institutions such as CENEEMA, IRAF, etc.

In IRAF for example, these activities include:

- Cocoa technology development programmes such as cocoa resistivity against insect pests, fungicide studies against rusts;
- Mapping of soil use in Northern Cameroon;
- Experiments on the improvement of coffee productivity.

One notable and frequent request formulated by the various research stations of IRAF is to increase their development facilities: reliable vehicles, power and supplies.

At IRTISS (Institute of Technological, Industrial and Mineral Resources Research), research efforts are being made on geological mapping for mineral resources and various hydrology services. Meanwhile, the Institute of Human Sciences is making efforts in the education system, stock-farming, transport and infrastructure, and migration.

At CENEEMA (Centre for Experimentation and Exploitation of Agricultural Machinery) efforts are being made to promote the development and adaptation of indigenous technology for use in the rural areas. Thus CENEEMA is, for example, providing regional blacksmiths with prototypes designed and developed by it for fabrication and sale to farmers. CENEEMA is well staffed, with considerable facilities, including supporting facilities such as machine shops, carpentry shop and spare parts storing system. With proper guidance and adequate support, it has the potential of developing into one of the leading Agricultural Machinery Development Institutions in Africa.

C) Research Activities in Private and Semi-governmental Institutions:

The Example of CDC

CDC, the Cameroon Development Corporation, is a large organization developing plantations of tropical crops, and has conducted many research experiments and achieved numerous successful technological innovations for rural use. In addition to its plantations of tropical crops, plantations of rubber, and its processing factories, an appropriate fertilizer formulation for oil palm cultivation, fungicide experiments, and food crop processing technologies have been successfully carried out. Thus CDC is one of the few institutions with some accumulation of technologies which can be transferable within the country.

The above are only samples of the industrial and technological research activities being carried out in the country.

These activities are very encouraging and should be stimulated in order to achieve more and better results. To this end, some appropriate measures are necessary, including the following :

- The research activities carried out within the country should be coordinated so that the results can be put to practical application.
- Priorities should be set at the national level, with a view to effective and continuous implementation of Government development objectives.

- There is also a need for a proper evaluation system of research programmes and research findings including their commercialization.
- A positive financial assistance should be given to the research and technology institutions for their activities and for training of qualified local staff in sufficient numbers.
- Above all, the Government should take bold measures to encourage overseas Cameroonian scientists/engineers to return to the country.

D) Administrative Framework for Technology Development, Transfer and Application

While the Government has taken necessary steps towards the consolidation of technological activities in the country through the establishment of the General Delegation for Scientific and Technological Research (DGRST) as well as the National Committee for Technology Transfer (NCTT), an administrative framework for technology development, transfer and application still needs to be more clearly defined.

Rather than embark on haphazard research activities as seems to be the case at the present, it would be important to identify and designate strategic industries under the economic development plan and to direct research effort towards these industries. In this regard, it would be necessary to co-ordinate the activities of existing research institutions, and assign them specific responsibilities for the development of indigenous technology as well as the acquisition and adaptation of foreign technology deemed appropriate for transfer to, and application in, the country - including the possible setting-up of an interdisciplinary unit with appropriate facilities for technology development and transfer as well as the commercialization of research results.

It should be emphasized that the mechanisms involved in the development, acquisition and transfer of appropriate technologies are rather complicated, involving the identification of needs from the business or entrepreneur viewpoint, choice of appropriate technologies required, negotiation, adaptation and commercialization.

There is also an urgent need to develop and upgrade managerial capabilities for a successful implementation of technology transfer.

With the adoption of this approach, the missions of the DGRST and the NCTT would include the following:

- To establish and recommend a technology transfer policy to relevant research centres;
- To assign technology items to relevant research centres for possible transfer and adaptation;
- To provide appropriate assistance for effective technology transfer;
- To assist in practical application of indigenous technologies already developed.

E) Existing Legal Framework for Technology Transfer

In addition to the Investment Code, the Cameroon Government has a Single Tax Regime and a General Taxation Code as well as a number of legal measures and systems designed to encourage and stimulate the growth of new industrial enterprises - particularly import substitution industries that make use of the country's natural resources. The Investment Code itself constitutes the focal point of Cameroon's free enterprise policy or "planned liberalism", as officially recognized. These legal measures apply, in particular, to the Agro-based Industry, Forestry Enterprises, Small and Medium-scale Enterprises, etc. and are designed to favour and promote the inflow of private capital, through fiscal arrangements which give preference to private investors as well as the granting of customs exemption on the importation of goods and materials necessary for manufacturing and processing. A number of financial and other institutions, notably the Société National d'Investissement (SNI), the Cameroon Development Bank (BCD), and the Société Camerounaise de Banques (SCB) have been established to cater to the investment requirements of potential investors.

The existing legal system, however, is designed to consider only the financial soundness of new enterprises. There is currently no official mechanism for examining the technological implications or technological requirements of these industrial enterprises. Some arrangements therefore need to be made for the

promotion and regulation of foreign technology flow into the country, as well as the development and commercialization of indigenous technologies.

F) Existing Financial Arrangements for Industrial Technology

According to the Decree No. 79/495 of 4 December 1979 which reorganizes the General Delegation for Scientific and Technological Research, the financial resources of the Research Institutes under DGRST consist of:

- subsidies granted by the State, local authorities and public bodies;
- revenue from their own activities;
- loans;
- donations and legacies;
- any other form of assistance.

The above financial sources for the institution do not fully meet the national requirements. Research institutions hardly have revenue in their initial stages, and the State, local authorities and public bodies in the developing countries are generally short of funds to support sufficiently and continuously the research activities of the research institutions after they have been established in buildings with research equipment and key staff. Different financial mechanisms from the above, therefore, need to be considered for the sustained development of research and technology activities.

V. Alternative Science and Technology Policies in Relation to Government Development Objectives and the Physical and Human Resources

A. Technology Transfer and the Need for Efficient Management

The international dependence of developing countries on the industrialized world may be categorized into three major areas: a) trade dependence; b) financial dependence; and c) technological dependence. Although all three aspects have important implications on the new international economic order, technology has come to have a central position and to play a key role in the process towards emancipation and self-reliance of the developing countries. By using modern or appropriate technology, and by increasing research and development (R and D) capacity, it is possible to increase industrial production and decrease trade dependence. There is thus little doubt that developing countries must develop, increase and strengthen their own technological capacity in order to reach economic independence.

Two approaches exist for increasing the technological capacity of developing countries. The first one is the transfer of technology to developing countries, and the other is for the developing countries to produce their own technology. It is obvious that because of the weak technological position of most developing countries, greater emphasis (at least for the time being) will continue to be accorded to the acquisition of foreign technology as a short-term measure towards increasing industrial productive capacity in the country.

The transfer of technology covers a wide range of areas in which scientific and technical research are applicable. These include: a) discovery of new products, b) exploration and use of raw materials, c) improvement of production methods, techniques, processes or equipment, d) research in marketing systems and organization, e) feasibility and productivity studies, and others.

Industrial research always needs international exchange and co-operation. This is a world-wide trend today. In the developing countries, technology transfer is drawing increasing attention because it is increasingly understood as a short-cut to industrialization. And today, the transfer of technology across national boundaries is as important as the transfer of capital to the world economy. Specifically, the transfer of technology may involve the following:

- 1) transfer of research and development results.
- 2) transfer of design and engineering data.
- 3) transfer of personnel from advanced countries to the developing one with a view to demonstrate and train personnel in the receiving countries.
- 4) sending personnel of developing countries to advanced countries for training and education.
- 5) Finally, transfer of plant and equipment from an advanced country to the developing country.

However, most developing countries are not fully prepared to effectively utilize the technology available to them. In the developing countries, the supply of industrial capital is not adequate and the technological infrastructure is either not developed or is weak. Furthermore, specialized research organizations and the number of well-trained scientists and managerial personnel are in short supply.

Often, workers are not experienced and communities are not conditioned to the kind of discipline that is required to operate modern technology in the developing countries. In general, when the industrial development process has been initiated, a series of service institutions spring up, such as machine shops, welding establishments, docks and railroad sidings, warehouses, and some sort of marketing institutions. These facilities are essential for an economic take-off but they cannot be developed easily by small local entrepreneurs with very limited capital. For an accelerated industrial development, therefore, concentrated efforts by the central government are urgently needed in the development of these facilities.

On the other hand, it is necessary for the developing countries to attach as much emphasis on the efficient management of the introduced advanced technology as on the technological transfer itself. It has often been said that running a research establishment is like running a gambling concern and involves incalculable risks for unassessable rewards. Thus the manager's role is to minimize the risk and maximize the reward. His principle task will be to establish project areas which will best serve the interest of the country. The manager has to establish a style of management which will confer a degree of freedom, substantial job satisfaction, and continued enthusiasm among his subordinates. A project can only be usefully carried out if it is well serviced by engineers and technicians and if it relates to other activities of the whole project. Also the managerial jobs demand maximum efficiency in recognizing the ability of employees and the financial limitations of the organization.

If the managers are to compete successfully in the international market, they will need more than a university training in accounting, science, engineering, economics, marketing, or management. They will also need a readily accessible reservoir of information which would provide leads on how to deal with various management problems. All the minor innovations which, taken singly, have a barely perceptible effect upon improving productivity, stability of employment, or quality of product must be brought together and more readily available to the managers to help them diagnose difficulties and try to find solutions. Here, we find a strong need in Cameroon for a center for dissemination of management information.

The managerial job requires a high level of intelligence and broad educational background. Therefore, the cadre of management talent cannot be drawn from any single division of the university or the business world or from any stratum of society, because of the variety of tasks to be performed and the large number of managers required.

Managers in the more technical industries such as electronics and chemical processing are likely to be drawn from the engineering staff of the international firms or research institutions. Another important source of managers is to be found among the locally trained technicians and engineering aids. They might be developed first into foremen, and then later into managers, usually for small firms. The business administration, engineering and science, and other specialists from the local and foreign universities that are trained for business, if they are available, tend to be attracted to the larger firms and government corporations like the Cameroon Development Corporation (CDC).

Another important source of managerial talents is the law profession. In the course of rapid economic development, it is natural that some of those who are trained in law would be diverted to the establishment of new industry or research institutions. There has been a growing need for the legal service as the number of foreign investment and technological transfer is on the rise in recent years in developing countries.

On the whole, the shortage of competent managers is one of the greatest barriers of rapid industrialization. Foreign capital and technology might be transferred within a relatively short period of time; but the efficient management of the transferred technology is of paramount importance to successful industrialization in the developing countries.

Despite the shortage of key personnel, however, it is rather remarkable to observe how rapidly local personnel can take over the posts of chief officers in charge of whole operations in a society committed to mass education. Thus, a continuous government effort in improving the quality of education is crucial for obtaining future managers. As a transitional measure, advisory services of advanced countries are usually needed in three main areas in developing countries: marketing, management, and technology.

Most business failures in the developing world may be attributed to inadequate research of domestic as well as international market conditions prior to initiating the business. Even after the business is a going concern, marketing must receive continuing attention. A careful and continuous study of population change,

income change, and the change of the consumer tastes with which the product, price, channel of distribution, and promotion strategies are formulated is extremely important. Business management is also important as it involves such areas as financial management, inventory control, maintenance of records, cost accounting, labor relations, personnel relations, quality control, production scheduling, and the like.

In the area of technology transfer, attention should be paid to the level of technology to be introduced as well as its successful application to existing industries whose technical personnel need to be familiar with the latest in technologies developments and the methods used in their transferring. The commonly used methods for technology transfer include training programs, research institutes, campus-to-campus programmes, technological transfer by capital attraction, joint ventures and turn-key projects.

Specialists from the more developed countries often teach managers as well as technical personnel, in such areas as marketing, management, as well as the technical aspect. Alternatively, people from the developing countries are sent to advanced countries to be trained. The types of programmes are commonly sponsored by either governments of the involved countries or international organizations such as UNIDO, the World Bank and other UN and bilateral and multilateral aid agencies.

Many developing countries have in the recent past established their own research institutions usually in collaboration with corresponding institutions in an advanced country. These institutions serve as a focal point for the transfer of technological information, flowing from the more developed countries. There is often a danger in this method in that the research institution in the developing country may experiment unsuccessfully with the development of a technology imported from the more developed countries. To avoid the ivory tower approach, practical industrialists should participate in the organizational operation of these research institutions and there should be a well planned organizational framework as well as the availability of efficient management skills, as emphasized earlier.

E. Development of Indigenous Technological Capacity and the Need for Greater Government Support

The alternative to the transfer of technology is to produce both scientific knowledge and technology in developing countries. One of the most critical factors in the process of development is the ability not only to assimilate and adapt foreign technology but, more fundamentally, the capacity to generate home-grown technology. This ability to create the country's own capacity for domestic technology production is a prerequisite for self-reliance.

The basic reason for the failure of most African countries to develop local technological capability lies in the lack of clear government policies and adequate and effective institutions to implement these policies. Any attempt to postulate policies and modalities for strengthening the indigenous technological capacity must therefore take into account the need to formulate appropriate national development policies - of which a technology policy shall form an integral part. It is within the framework of this policy that the institutional, administrative and legal machinery for the development of technology can be expected to help in achieving their desired objective, and lead ultimately to technological self-reliance. Neither the foreign private investment, joint-ventures nor state enterprises in Cameroon have led to the development of a meaningful indigenous technological base in the country - with the possible exception of the Cameroon Development Corporation (CDC). Joint-ventures and state enterprises often had to make management contracts and licencing and other agreements to facilitate the acquisition of technology and know-how. It was found, however, that no government mechanism seems to exist for monitoring the implementation of the terms of the contracts. In many cases these various agreements offered different modalities and levels of control by foreign enterprises, making it easier for them to reserve the critical managerial and technical positions for foreign employees, thereby frustrating the development of local technological capacity. Even where the contracts included a clause calling for gradual Cameroonization of the top management and

technical positions, these were frequently ignored under the pretence that no qualified Cameroonians could be found. While this may be true, it is also true that these foreign investors or joint-venture partners did not embark on any systematic effort to train the Cameroonian counterparts. A training component needs to be included in all future contracts with foreign or joint-venture industrial enterprises.

It was also found that the manner in which technology has been transferred, without adaptation or modification, has led in most cases to the suppression of both local innovation and utilization of local inputs, thus killing the possibility of developing a local technological base. This has resulted either from takeovers of young local enterprises or by their being squeezed out as a result of a policy of tariff protection that did not distinguish between small and weak local industries on the one hand, and foreign enterprises often possessing high level technology and highly developed business organizational capability on the other.

Even where local consultancy or other technical expertise exists, in spite of policies to ensure utilization of local manpower, the tendency was to prefer foreign expertise. The result is that the opportunity of building up local expertise is lost. This approach has also led to a failure to achieve an effective linkage between small-scale industries that could service large and medium-scale industries.

C. The National Committee for Technology Transfer (NCTT)

Objectives

The objective of the NCTT is to facilitate the process for the development and transfer of technology in order to meet the technological requirements of the national economic development plan. In this regard, the Committee is also expected to give guidance and direction to the General Delegation for Scientific and Technological Research (DGRST) in monitoring and co-ordinating the R and D activities of the country.

Functions

As outlined in the Decree No. 78/109 establishing it, the functions of the NCTT include the following:

- a) identification of national technology requirements;
- b) development and implementation of modalities for the development, transfer, adaptation and effective application of technology;
- c) evaluation and selection of appropriate technology;
- d) promotion and regulation of foreign technology flow into the country.

Membership

The Decree establishing the NCTT also defines and sets out the members of the Committee. In addition to the members already provided by the Decree, it is recommended that the Director of the Ecole Polytechnique, representatives of industry, and the heads of selected research institutions should be included as members.

The Technical Commission

The Decree further recommends the formation of a Technical Commission as a specialized arm of the NCTT, charged with carrying out studies and other tasks on behalf of the NCTT. In addition,

the Technical Commission would carry out studies and make recommendations to the NCTT on such matters as national technology programmes and projects in each sector of the economy, especially the industrial sector.

It is recommended that the Technical Commission should set up a number of specialized committees composed of representatives from relevant research organizations, industry, educational and training institutions and government. As a start, specialized committees could be established in the area of rural development, food storage and processing, chemicals and petrochemicals, energy, environment, electronics and telecommunications. Each committee would then be required to examine the technological options currently available within the country and in line with the national development objectives, make recommendations on the subsequent measures to be taken by the NCTT.

D. Proposal for a National Office for Technology Transfer (NOTT)

According to the Decree establishing the National Committee for Technology Transfer, the Secretariat of the Committee is to be administered by the General Delegation for Scientific and Technological Research (DGRST). This arrangement is to be commended in that it links the activities of the Committee with those of the government agency most directly responsible for co-ordinating technological research in the country, that is, the DGRST.

Noting, however, the objectives, the mandate and the terms of reference of the National Committee for Technology Transfer, and noting, in particular, that the Committee is essentially an ad hoc body, it becomes obvious that the bulk of the responsibility for carrying out the Committee's programmes, decisions and activities lies with the Secretariat of the Committee. It also becomes obvious that the Secretariat would have to be greatly strengthened in order for it to carry out these tasks, and further, the Secretariat would have to be a permanent and full-time office of the Committee. The present arrangement does not achieve these aims since the Secretariat works full-time for the DGRST and only part-time for the NCTT.

Consequently, in order to translate the functions and objectives of the National Committee for Technology Transfer into practical operational terms, it is recommended that a National Office for Technology Transfer be established, which will serve as the full-time secretariat of the NCTT. In addition to the responsibilities already defined by the Decree, the National Office for Technology shall also have the following functions:

- i) prepare and regularly update an inventory of technologies currently available in Cameroon;
- ii) compile and disseminate information, on a regular basis, on the research results of the R and D institutions in Cameroon;
- iii) register all contracts or agreements having effect in Cameroon for the transfer of foreign technology to Cameroonian parties, enterprises, joint ventures, etc.;
- iv) monitor, on a continuous basis, the execution of the

- terms and conditions of such contracts and agreements;
- v) organize short-term training courses for the improvement of the negotiating and bargaining skills of Cameroonians with a view to ensuring the acquirement of the best contractual terms and conditions by Cameroonian parties entering into any contract or agreement for the transfer of foreign technology.

E. Proposal for a Cameroon Institute for Industrial Research, Consultancy and Technology Transfer

In an effort to develop her national technological capability and at the same time strengthen her self-reliance, Cameroon has established a number of research institutions for the purpose of developing her natural resources and raw materials. Although the amount of research carried out in these institutions is at present small and fundamental, it nevertheless forms a good basis for future development. A major fault, however, is that most of the research results are never applied; there is no mechanism for commercializing the successful research results and making them available to the potential users - particularly in the rural areas as well as to industrial users, especially small and medium-scale industrial enterprises. Some of the research activities also tended to be highly theoretical, unrealistic and with little or no practical applicability. There is thus a need to bridge the gap between the R and D organizations in the country and the medium and small industries as well as the rural population so that they can benefit from the technical counseling service available from the R and D institutions. In other words, there must be a technical service agency capable of assuming the role of a go-between for small and medium industries and R and D organizations.

It is for this reason that we are recommending the establishment of a Cameroon Institute for Industrial Research, Consultancy and Technology Transfer. The Institute would, among others, have the following functions:

- (i) act as a catalyst in the development and transfer of indigenous technology to the primary and secondary sectors of the Cameroon industry; in this regard the Institute would promote, co-ordinate and undertake scientific and industrial research which would benefit industrialization in Cameroon; act as the governments' technical link to industry;

- (ii) provide "Production Support Services" such as laboratory testing and analysis, quality control, metrology, training, and market research and analysis. In providing these services the entity will perform a function different from that performed by existing research organizations and commercial companies, since it will emphasize the diffusion of manufacturing know-how aimed at building domestic managerial and technological capabilities. Thus, the entity will provide them for only a short period of time followed by trouble-shooting and backup support, particularly in the early stages of production. Easy access to these services in Cameroon is expected not only to encourage small and medium-sized companies to enter these industrial activities but to also help attract potential joint venture operations to the country.

This product-market development function is expected to be particularly useful to industry, unlike most research organizations. The entity could then assist industry in the critical early stages of commercialization beyond the research and development stage. It is intended to serve as a temporary backup "Second Source" once production has been transferred to industry;

- (iii) collect and integrate the results of R and D activities which are dispersed in the various research-related organisations within the country, link between technology supplier and buyer, facilitate the commercialization of R and D results within the country, learn and practice R and D management and industrial management through production activities, and participate in evaluating and selecting foreign technologies to be transferred into Cameroon from abroad;
- (iv) support the government in technology import business and advise the government about technology import policy from the industrial and technical points of view: make technological inputs to the elaboration of government technology policy;
- (v) provide technological assistance and services generally required by industry (especially small and medium-scale enterprises) in the following main categories:

- Testing, analyzing and evaluating raw materials and intermediate products;
 - Testing and analyzing finished products for standardization, quality control and certification;
 - Specific information on the current state of world knowledge in industrial, technological and techno-commercial areas;
 - Instrument repair, maintenance, and calibration;
 - Designing equipment (e.g., simple ovens, kilns, mixers, and driers);
 - Trouble-shooting in industrial plants;
 - Technical investigations to improve the quality of finished products and increase process efficiency;
 - Developing new processes for current or new products at both the laboratory and pilot plant levels;
 - Techno-economic studies;
 - Engineering design and service work;
 - Training of technical staff.
- (vi) act as the technical arm of national development banks and investment corporations such as SNI, BCD, SCB, etc. by providing them with technical and techno-economic inputs for their evaluation and consideration of requests to finance industrial and development projects;
- (vii) make technical inputs during the evaluation, selection and acquisition of foreign technology; suggest alternative technologies; carry out the adaptation of imported technology and know-how as well as locally-developed technology; advise on the potential and utilization of an imported technology, thus preventing industry from buying obsolete technology, inappropriate technology, over-priced technology, or technology which is already available in the country. The attached table summarizes the direct and indirect functions of the Institute in the process of technology transfer.

THE ROLE OF AN INDUSTRIAL R AND D INSTITUTE IN THE TECHNOLOGY TRANSFER PROCESS

Table I

TECHNOLOGY TRANSFER STEP	ROLE OF INSTITUTE
A. <u>Information on Section of Technology:</u>	
(i) obtaining and providing information on desired technologies;	(i) major responsibility; must maintain up-to-date technological information service;
(ii) identification of alternate technological possibilities;	(ii) major responsibility: ties in with (i);
(iii) techno-economic and feasibility studies	(iii) depending on responsibilities and capabilities of the institute; input can therefore be major or minor;
(iv) selection of the most desirable technology;	(iv) only technical and techno-economic inputs, ties in with (iii); legal and financial considerations outside the institute's responsibility;
(v) identification of alternate sources of the desired technology;	(v) major role: ties in with (i);
B. <u>Obtaining and Introducing the Technology to be Transferred:</u>	
(vi) acquisition of rights to technology and obtaining technology know-how, including the formulation and closing of all types of technology transfer and licensing contracts;	(vi) this is not a responsibility of R+D institutes, except to provide technical information during negotiations; ties in with (i) and (iv).
(vii) establishing physical facilities and factories;	(vii) not the responsibility of the institute;
(viii) absorption of transferred technology, i.e., training of staff and personnel using technology;	(viii) a major responsibility of R+D institutes; one key function is the introduction of new technologies through the institute's laboratories or pilot plants by demonstrating these to industry personnel, i.e., introduce the technology through training;
C. <u>Maintaining, Supporting, and Further Developing Transferred Technology:</u>	
(ix) providing technical services for the transferred technology;	(ix) a major responsibility of R+D institutes;
(x) carrying out R+D for improving and further developing the technology;	(x) a responsibility of the institutes;
(xi) continued training of industry staff and personnel;	(xi) a continuing responsibility, although not always carried out by R+D institutes;
(xii) maintain information surveillance in the field of transferred technology;	(xii) an important institute responsibility;

For the above reasons, it is suggested that the Cameroon Institute for Industrial Research, Consultancy and Technology Transfer be established as a comprehensive and multi-disciplinary research centre - a centre of excellence - for the development and transfer of industrial management and technology in and to Cameroon, covering a broad spectrum of R and D activities for the generation of appropriate technology as well as the adaptation of imported technology.

F. Corporate Framework

The Cameroon Institute for Industrial Research, Consultancy and Technology Transfer would have to be an autonomous body outside the government administrative machinery. Policy directives for its activities, operational framework, employment and financing will be provided through a Board of Trustees or Management whose members should be drawn from the National Committee for Technology Transfer, the DGRS^m, other experienced leaders of government, industry, and the scientific and technical community - but not dominated by any of these groups. Funds for research and operation should be donated by Government, industry and other sources.

To ensure the autonomy of the CIIRCTT for such reasons as given above, a special law should be promulgated. Proposal for a suggested special law as well as Articles of the Institute are attached as Appendices B and C.

G. Legal Framework for Technology Transfer

General considerations in designing a system for technology transfer should include the following:

- i) The system should be efficient, dynamic and yet flexible, unified under a special law or a coordinating point for various regulatory mechanisms.
- ii) It should be effective in promoting technology transfer, and be closely related to foreign investment.
- iii) It should have both a promotion and regulatory mechanism and be closely linked with the activities of supporting organizations such as the SNI, PCD, SCB, as well as the

proposed National Office for Technology Transfer and the Institute for Industrial Research, Consultancy and Technology Transfer.

Whether the evaluation and approval of technology is done by a single or multidisciplinary agency, or by a single unit coordinating a number of agencies, depends on individual conditions and needs. Essential, however, is the need for built-in flexibility and a mandate to stimulate the technology transfer while regulating it.

Where no institutions exist, it is desirable that a start should be made with a small unit which could take up the comprehensive work involved in technology transfer; the unit would then expand and specialize as personnel develop through experience. In the early stages of operation, owing to the involvement of a number of decision-making bodies, delays could occur in the finalization of contracts or agreements. It is, therefore, important to be very selective in the type of information which is real, rather than burden busy enterprises with excessive paper work. A proposed Legislation for Transfer of Technology is shown in Appendix A.

H. Financial Mechanism for Promotion of Technology Development and Transfer

The creation of an industrial research institution does not necessarily imply its success. Every effort must be made to nourish and sustain it, particularly during the early formative year. One of the major causes of failure of research institutions in developing countries is that once the decision has been made to establish them, not much else is done to nurture their growth and to ensure their success. The financial resources required for this growth is either not provided or not in the required amount. Because research institutions frequently need money at short notice to purchase or refurbish needed equipment, a financial mechanism for research activities needs to be established outside of the normal government budgetary system which is usually a long, complicated and often frustrating process with a lot of regulating measure.

A technology research and development fund should be established by Government to assist in financing both the National Office for Technology Transfer (NOTT), the Institute for Industrial Research, Consultancy and Technology Transfer (IIRCTT) and various research activities carried out in the country as well as industry-sponsored projects carried out at the CIIRCTT for the development and transfer of technology. It will not finance the in-house researches conducted by industry. To ensure that research work is closely tied to industry goals, the major proportion of the research carried out in CIIRCTT's facilities will be required to have an industry sponsor. In the initial years, industry will contribute a little portion of the costs of industry-sponsored projects. Research projects sponsored by small and medium-sized firms should receive particular emphasis by CIIRCTT. Industry's contribution to research project costs, as well as the percentage of industry-sponsored projects is expected to increase over time as CIIRCTT's success in carrying out research projects is demonstrated. The CIIRCTT will undertake prototype production until sufficient volumes are built up for transfer to industry for large-scale production.

Organization and Administration

Identification of suitable research projects in conjunction with industry is the responsibility of the CIIRCTT's management. The Technical Commission, in consultation with industry will, before the beginning of each fiscal year, review and approve a 5-year research programme consisting of a detailed research programme for the first year and an indicative programme for the four subsequent years. The 5-year programme will be updated and reviewed by the Research Committee of CIIRCTT at least half yearly. This approach is expected to ensure the coordination and integration of the research efforts in Cameroon.

Recovery of Research Costs

Research costs will be recovered through royalties on successful research projects. Such royalties will be set at a level sufficient to recover, in real terms, research costs on both successful and unsuccessful research work. Royalty rates and the royalty period will be negotiated at the time of signing a research contract with the sponsoring firm.

Goal Amount of Reserve Fund

Since the sources of research funds in developing countries are usually sporadic, a stable source of fund to maintain a steady flow of research activities is required. On a practical basis, it is desirable to secure about \$20 million in order to support the NOTT, CIIRCTT and the other major institutes as a production-type oriented research organization. As one of the methods for establishing Reserve Fund, "Import Tax for Promotion of Technology Transfer" could be considered in the manner of 0.1 percent of importing products for domestic consumption.

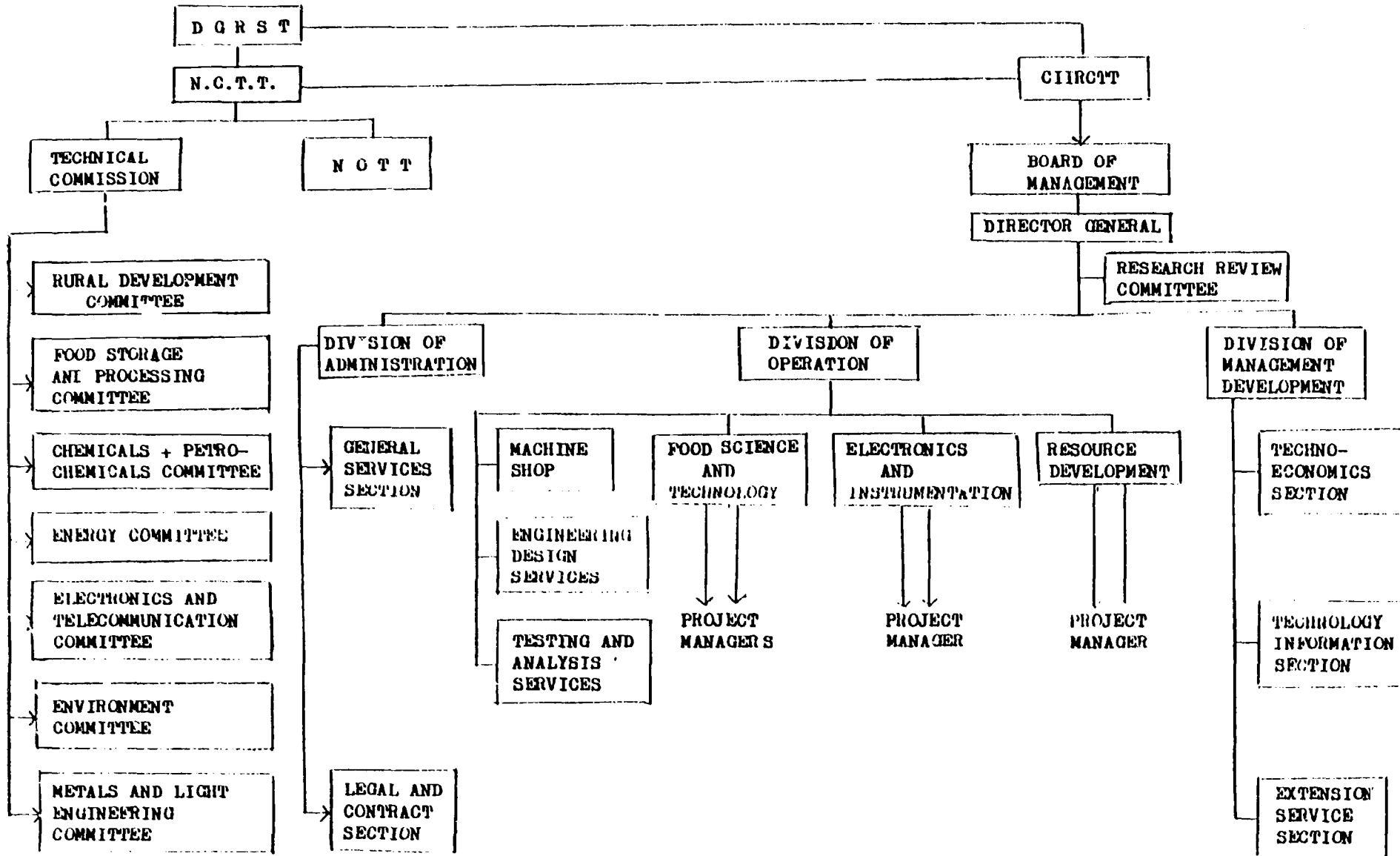
VI. Operation of the Cameroon Institute of Industrial Research,
Consultancy and Technology Transfer (CIIRCTT)

A. Functional Organization

A proposed organizational chart for CIIRCTT is shown in figure 1. It results from direct experience gained in the process of providing for technology development programmes in Korea and other developing countries, but it has been modified to accommodate the special conditions, i.e. management capability development, production-oriented function, etc. identified in Cameroon. It is not meant to be final or all-encompassing, but is intended to provide the basic structure upon which the future organizations can be developed.

The ultimate authority in this Institute resides in a self-perpetuating board of management. At the first level below the board of trustees is the Director General who is appointed by the Board of Management. Reporting to the Director General in a line relationship are directors of divisions such as division of administration, division of operation and division of management development. In a staff relationship to the Director General is a Research Review Committee. This Committee consists of the Director General, Division Directors and project managers. Operation of this committee is described in the Articles.

Organizational Chart of the CIIRCT



Note: The NCTT would serve as the Secretariat of the NCTT.

B. Functions of Each Section

The functions of each section are as follows:

General Services Section

Personnel management, financial management, procurement and maintenance would be the main functions of this section in the initial stage of CIIRCTT.

Legal and Contract Section

This section provides licensing of the technology developed by CIIRCTT especially to Cameroonian companies at 51% equity share, and sells prototypes or by-products resulting from pilot production plants and patents know-how developed by CIIRCTT.

Project Managers

Main functions of project managers include

- Development of production technology and adaptation of the transferred technology;
- Factory management;
- Review on the economic scale and on the integrated production system;
- Cost accounting of the project.

Machine Shop, Engineering Design Shop, Testing and Analysis Laboratory

Machine shop includes such activities as fabrication and electroplating. The engineering design shop undertakes such work as the design or modification of designs for machinery, pilot and demonstration plants as well as product and process designs. The testing and analysis laboratory covers physical, organic and inorganic chemical tests and analysis.

Techno-economic Analysis Section

This section specializes in the financial and economic feasibility studies on the technology transfer proposals, and conducts market surveys. According to evaluation of the technology transfer proposals, this section also recommends the technology transfer system to the government or industry authorities concerned.

Technology Information Section

The aim of this section is to contribute to the promotion of science and technology and the development of industry in Cameroon by providing industrial and technological information. To pursue this, this section would be devoted to the collection, processing and storage of industrial and technological information comprehensively and systematically, and to the dissemination of the necessary information to the industries, academic circles, R and D institutes, government organizations and individuals. As a national focal point, this section would also play a leading role in the field of documentation, in the diffusion of documentation and information expertise and in the integrated development of industry and technology - related information activities in Cameroon.

Main activities

- Acquiring and organizing of information materials;
- Information processing and storage:
 - classifying
 - indexing
 - abstracting
 - translating etc.
- Publication service:
 - current list of foreign patents
 - new products and new technology
 - state of the art report, etc.
- Literature retrieving service;
- Dissemination of documentation technique;
- International exchange of information;
- Information enquiry services.

Extension Service Section

Training of Cameroonians is expected to be the most important means of developing technological and managerial capability. This is expected to serve the dual purpose of training industry personnel and fostering close working relationship

between CIIRCTT and industry staff. Additionally, this section conducts workshops/brief programmes of management for Cameroonian industrial leaders and entrepreneurs.

Personnel

Aside from reviewing his education and experience, there is no real way of judging an individual's aptitude for technology development activities. Initial impressions are that an opportunity to participate in such activities over a sufficient period of time has not existed among Cameroonian scientists and engineers. However, it is quite likely that some desirable candidates for various positions will become available prior to the time that they could most efficiently be integrated into the CIIRCTT. Rather than risk the chance of losing such potential staff members, it is recommended that they be retained and that suitable training in other developing countries be initiated.

Of paramount importance to the future success of the Institute is the selection of top-grade individuals for the management positions, especially those of the Director General and his key staff. Under strong leadership, even inexperienced lower-level management can quickly be brought to a point of proficiency.

The position of Director General, for example, should be filled by an individual who is a first-rate administrator with a strong technical background. That is, this position requires executive ability, leadership qualities, experience and wide acquaintanceship with industry, a well-developed appreciation of the relationship and significance of technology development and its potential in Cameroon, and an awareness of, and ability to work within, the political environment. Accomplishment and demonstrated ability in some field of engineering or science is an additional factor.

The men in charge of the major divisions should be primarily men having both a demonstrated professional capability in some field of science, engineering, business management, or economics, and also the inherent qualities which enable them to direct the research work of others and to provide that element of leadership in research which will determine the success of the Institute.

Main qualifications for key positions are as follows:

It is recommended that suitable training programmes be undertaken quickly in case of difficulty in finding out such persons in the initial stage of the project.

Director of General Administration

- Educated in a university of public or business administration;
- An awareness of legal system, proficiency in personnel management, and experience in general affairs;

Director of Operation

- Education in a university of science or engineering;
- Experience in factory management, including machine shop and testing and analysis fields;
- An awareness of management concept, especially in engineering economics and also including cost accounting.

Project Manager

- Educated in the university of science or engineering;
- Experience in the formulation and implementation of a unit project;
- An awareness of industrial engineering.

Director of Management Development

- Educated in the university of business administration;
- Experience in the planning and implementation of training programmes, technical information, and economic analysis;
- Knowledge of the enterprise level.

Chief of Techno-economic Section

- Educated in the university of engineering or business administration focusing on the systems analysis field;
- Experience in financial analysis and economic analysis;
- An awareness of engineering (in the case where candidate's educational background is business administration).

Chief of Technical Information

- Educated in the university of science, engineering or business administration, especially in the field of Technical/Management information systems;
- Experience in the acquiring, organizing and processing of data, documentation technique, etc.

C. Training Programme

It is recommended that the following training programme for the key staff of the Centre be timely implemented for the successful start of the initial projects of the Institute:

Objectives

The objective of this training programme is to provide the key personnel of the Institute with the requisite practical training, as well as the definition, scope, methodology and other related information necessary for carrying out their respective responsibilities.

Initial training fields and number of trainees required

Thirteen persons from eight fields are included in the programme as follows:

(a) Top management	:	one person
(b) Legal/Contract	:	one person
(c) Techno-economic analysis	:	two persons
(d) Technology information	:	one person
(e) Project manager	:	two persons
(f) Testing and analysis	:	two persons
(g) Machine shop	:	two persons
(h) Engineering design	:	two persons

Training period of each field

Total man-months of sixty-two are required. The sooner the starting date of training, the better would be the effect of the training for the smooth execution of the Institutes initial project, the success of which is most important in establishing the Institute's credibility.

(a) Top management	:	two months
(b) Legal/Contract	:	three months
(c) Techno-economic analysis	:	six months (12 man-months)
(d) Technology information	:	three months
(e) Project manager	:	nine months (18 man-months)
(f) Testing and analysis	:	three months (5 man-months)
(g) Machine shop	:	three months (6 man-months)
(h) Engineering design	:	six months (12 man-months)

Training method

It is desirable for the training to be on the basis of on-the-job-training together with accompanying lectures by a trainer preferably in a specialized research institute of a developing country.

Top management should visit and observe a number of research institutes in different developing countries, and discuss thechnology development systems in other developing countries with the heads of those institutes.

Qualifications required for the trainee and training contents

(a) Legal/Contract field

Qualifications

- Educated in the university of public administration or law;
- If available, two years or more of experience in the same field.

Training contents

- Procedures of R and D activity;
- Contract practicing for in-house/contract projects;
- Legal system development for technology transfer;
- Post-management of R and D projects;
- General administration relating to the above matters.

(b) Techno-economic analysis field

Qualifications

- Educated in the university of business administration or economics;
- It is desirable that one be from business administration and the other be from economics;
- If available, two years or more of experience in the field of investment planning at the enterprise level/national level.

Training contents

- Research methods in general
- Market survey methods
- Demand forecasting methodologies
- Plant lay-out
- Product mix
- Financial analysis
- Preparation of financial statements
- Marketing strateg- development
- Economic analysis
- General planning relating to the above matters

(c) Technology information field

Qualifications

- Educated in the university of natural science or engineering;
- If available, two years or more of experience in the field of information gathering/dissemination.

Training Contents

- Methods for acquiring and organizing of information materials;
- Information processing methods;
- Information dissemination;
- Publication and distribution of current awareness media;
- Literature retrieving service;
- International exchange of information;
- Documentation technique.

(d) Project Manager

Qualifications

- Educated in the university of engineering
- If available, 5 years or more of experience in the business field.

Training contents

- Management of manufacturing plant
- Lay-out of production line
- Inventory control
- Engineering economics

(e) Testing and analysis lab. and Machine and Engineering design shop.

Qualifications

- Educated in the university of engineering
- If available, 5 years or more of experience in the same field.

Training contents

- Operation of physical and chemical analysis lab. and machine and engineering design shop.

VII. Evaluation and Selection of Technology

A. General Consideration for Choice of Technology

Regulatory agencies in the developing countries are often faced with the task of choosing one of a set of competing technologies relating to a particular project. Business risk is not always associated with the technology itself. It could lie in demand, estimates of investment, legal constraints and political and social factors. So, the function of a regulatory body can only be construed as that of:

- (a) Reviewing the process by which the entrepreneur has selected a particular technology;
- (b) Reviewing the technology in terms of the national economy, for example, taking into account the:
 - i) Appropriateness of the national infrastructure;
 - ii) Value-added and other contributions to the economy;
 - iii) Capability of the buyer to fully utilize the technology;
 - iv) Cost of the technology;
 - v) Source of the technology;
 - vi) Terms that will control the use of technology.

General considerations for choice of technology are as follows:

Technologies freely available within the country

- Contracts or agreements cover foreign technical know-how that a local research institute is able to provide;
- It covers the continuing supply of technical services that buyers could perform without additional cost;
- The object of the contracts or agreements covers exclusively the exploitation of a patent that is no longer valid in the country.

Points to be considered on royalty payments

- The manner in which the payments are to be effected,
- Estimated sales volume of production during the period of the contract or agreement,
- The specified dates when payments should be made,

- The effect of payments for technology on the buyer,
- The effect of the payments on the country's balance of payments,
- The effect of the payments on the cost of the goods and services produced.

Points to be considered on the rights to use patents

- When a patent has been requested but not yet granted,
- Infringement on licensor patent rights by a third party,
- Limiting the field of use of a patent.

Points to be considered on the technical assistance

- Payments on a continuous basis for the technology assistance,
- Limitations other than those pertaining to confidentiality,
- Any restriction concerning the use of non-patented know-how.

Points to be considered on basic and detailed engineering

- Defining the degree of responsibility of all parties involved,
- The type and scope of guarantees,
- The type and scope of services.

Points to be considered on managerial assistances

- Service, such as planning and programming, research and development, inventory control, financing, accounting, purchasing, and marketing, involved should be clearly defined;
- Training programme;
- The responsibility and functions of the supplier.

Points to be considered on intervention of supplier with the management of the buyer

- Decision-making position of the supplier in the business,
- Permanent employment of personnel by buyer at the request of supplier,
- Limitation on the production volume and price.

Points to be considered on the buyer's research and development

- Undertaking research, development and improvement concerning new products, processes, equipment, etc.
- Granting back to the supplier the results of the buyer's research development and improvement,
- Access to other sources of complementary technology.

Marketing factors

- Demand size and stability,
- Product volume, estimates of market share,
- Product mix, utilization of production line,
- Product quality, pricing,
- Break-even point operation,
- Distribution system, marketing channel.

Investment factors

- Trade-off in investment and operation costs for technologies of same products for comparison of production cost,
- Discounted-cash-flow for the calculation on the performance of the project as a whole,
 - . Net Present Value
 - . Internal Rate of Return
- Qualitative factors concerning investment,
 - . availability of management skills
 - . use of economic data (asset life estimations, competitive price)
 - . potential deficiencies in technical area (the qualities of inputs and outputs).

Economic factors

- Contribution to the improvement of the country's balance-of-payment position,
- Increasing employment of local labour,
- Utilizing local raw materials to a maximum degree,
- Contribution to the development of a well-balanced economy,
- Cost-benefit analysis as a method of evaluation.

B. Procedures for the Evaluation and Selection of Technology

Diagram on page 48 shows the procedures for selection of technology whose price exceeds a certain amount, say US\$100,000 of lump sum royalty. Four step approach is suggested in the Diagram. That is, four decision points before the final acceptance of a technology to be selected.

If an applicant submits the documents embodying contracts or agreements to the DGRST for registration, then documents are sent to the NOTT. The NOTT then evaluates the documents in close collaboration with the CIIRCTT and other relevant institutes in the country according to the four-step approach.

If the result of evaluation in the first decision point which examines "critical factors" by a check list presented on pages 49 - 51 is "no", the documents are returned to the applicant. In that case, if the applicant changes the contents of contracts or agreements as required by the NOTT those documents could be reevaluated; if not, finally rejected.

If the result of evaluation in the first decision point is "yes", the documents go to the second step for the qualitative analysis by experts in the corresponding technology field. One of the qualitative analysis methods will be discussed in detail. Courses of action on the result of evaluation are the same as those of the first decision point.

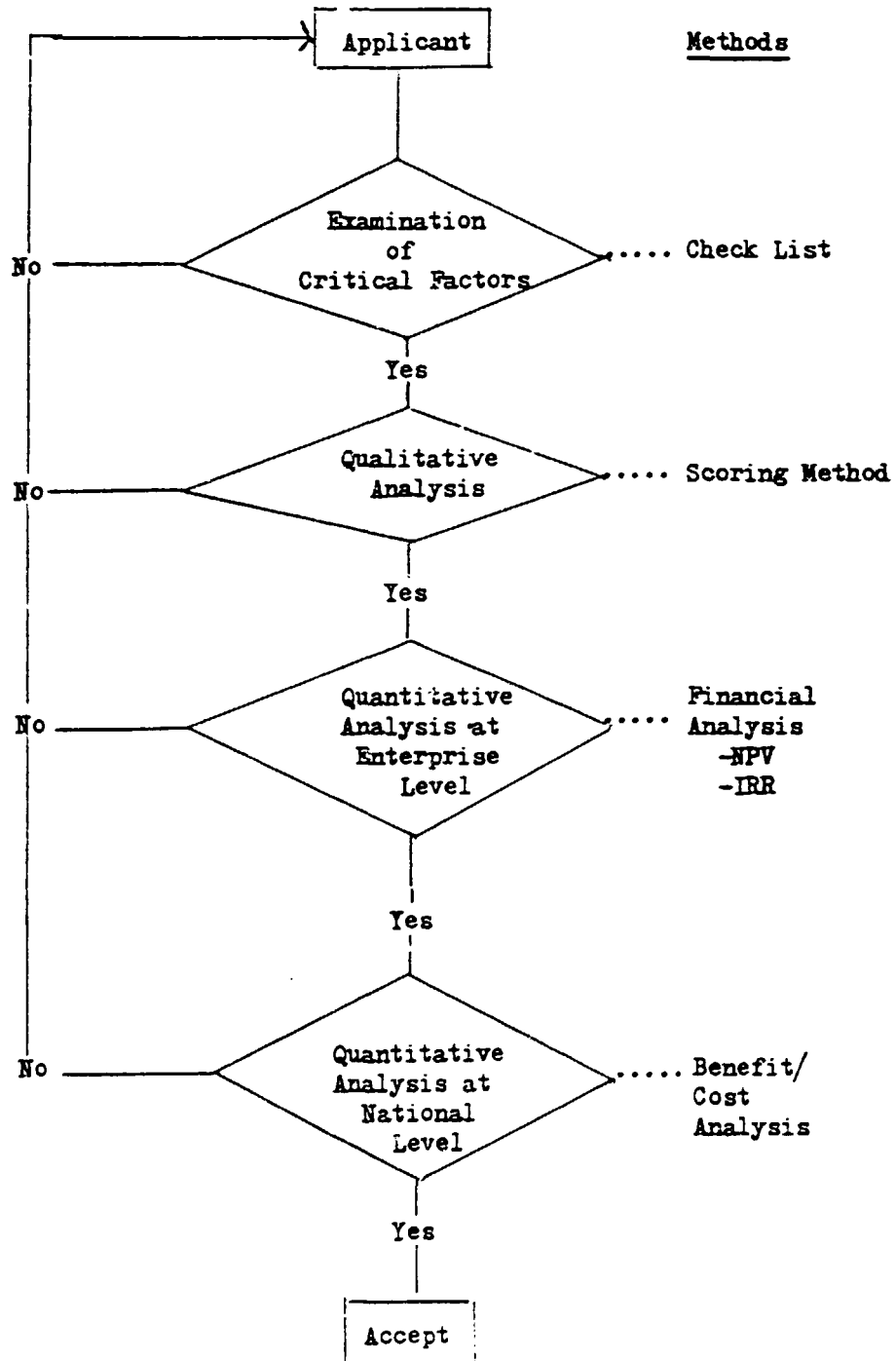
If the result of evaluation in the second decision point is "yes", the documents go to the third step for quantitative analysis at enterprise's level. The methodologies for this step will be discussed in detail. If the result of evaluation in the third step is "yes", the documents go to the fourth step for quantitative analysis at national level, which is also presented in detail.

If the result of evaluation in the fourth step is "yes", the proposed technology is accepted finally within the Division of Management Development. Evaluation data are sent to one of their committees of the Technical Commission by Director General for the approval of the proposed contracts or agreements. The approved contracts or agreements are then sent to DGRST for only the legal procedures. Then, the NOTT enters the Post-management phase.

The various scores given by each expert will then be summed up and the average computed for overall evaluation of the project. If the number of points scored is below a certain average, say 16%, the project will be rejected; otherwise it will be adopted or submitted to a new evaluation if the average number of points scored is not conclusive.

However, a project with a below-average score can still be adopted if the technology involved has an important impact on the development strategy of the country.

Decision-making Flow for choice of Technology



Questionnaire for Evaluators

Factors	Score				
	1	2	3	4	5

Strategic Factors

1. Technology relating to political stabilization (national defense)
2. Improvement of social welfare (medical technology)
3. Enhancement of cultural level (printing)
4. Educational objectives (education by broadcasting)

Technological Factors

1. Ripple effect
2. Accumulation effect
3. Manpower development effect
4. Utilization effect of existing technology/facilities

Manufacturing Factors

1. Utilization of existing experiences
2. Availability of raw materials
3. Availability of manpower

Financial Factors

1. Demand stability
2. Import substitution
3. Export possibility

Economic Factors

1. Increase of rural income
2. Employment effect
3. Foreign exchange earning ratio (balance of payments)

Financial Analysis

In general, Net Present Value (NPV) and Internal Rate of Return (IRR) methods are used for the financial analysis of a proposed project. Following are the key elements of these methods.

1. The basic assumptions in NPV analysis are:
 - (a) the applied discounting rate is correct;
and
 - (b) this rate remains unchanged over the project life.

If a proposed project may anticipate the following pattern of expenditures and income,

Project life	1st year	2nd year	3rd year
Income	X1	X2	X3
Expenditure	Y1	Y2	Y3
Net Income	(X1-Y1)=A	(X2-Y2)=B	(X3-Y3)=C

the present value of future net income, at a discount rate r , is

$$Z = \frac{A}{(1+r)} + \frac{B}{(1+r)^2} + \frac{C}{(1+r)^3}$$

Z is considered to be the net present value (NPV).

Any proposed project will be profitable if its NPV is above zero (positive) at the assumed discount rate.

The discount rate does not provide for inflation. It represents the net impact of the cost of raising various types of capital (equity, loans etc) in the context of the demand and supply of funds and risk factors in the environment.

2. However, knowing the NPV of a proposed project gives no indication of whether the project is close to the margin of acceptability. For this, another measure of profitability is needed. This is supplied by calculating the internal rate of return (IRR), which can be compared with accepted norms (say, dividend expectations on leading stocks) of yield in a particular industry or economy.

The IRR is calculated by setting NPV equal to zero and calculating the rate r , of the following equation: equation

$$NPV = \sum \frac{\text{Future income}}{(1 + r)^n}$$

The IRR is the rate that equalizes expenditures to income.

3. When we choose one between proposed projects A and B, even if project A has NPV higher than that of project B, project A should meet the acceptance criteria. That is, project A would also have to have an IRR above the prevailing yield rate. Both NPV and IRR have to be compared.

Social Benefit-Cost Analysis

It was intended that a case study about the social benefit-cost analysis for national economic profitability be conducted on the selected technology to be transferred in the first project of the NOTT. By the very nature of the elements involved in social benefit-cost analysis such as national parameters and information based on the feasibility report, however, it was not attempted for want of necessary information. It is suggested that "Guidelines for Project Evaluation", a UNIDO document, be utilized for the social benefit-cost analysis.

C Categories of Technologies to be Transferred in the Initial Stage

Based on the facts observed, and in view of Cameroonian needs for developing basic capabilities to adapt transferred technology, search of some items of appropriate technology has been tried in the following fields and categories:

Category 1.

Agro-industrial technologies for rural development

Category 2.

Industrial technologies for utilization of local resources

Category 3.

Required technologies for developing appropriate capabilities for technology transfer, possibly adequate to practise the whole process required in transfer.

Category A:

Technologies for crop storage and processing
Technologies for energy generation for rural requirements
Technologies for oils and fats
Technologies for up-grading handicraft

Category B:

Technologies for wooden furniture industry
Technologies for rubber industry
Technologies for tire and tube making
Technologies for plywood industry
Technologies for agricultural chemicals and pharmaceutical products

Category C:

- (i) Technologies related to the assembly of radio or television (consumer electronics) particularly so designed for rural areas in Cameroon.
- (ii) Technologies of appropriate modification of chemicals for agricultural use.

D. Criteria for Evaluation of First Project of CIIRCTT

The Criteria listed below have been given in order to guarantee the success of the first project of CIIRCTT which would be watched closely by individuals and organizations involved in science and technology development in Cameroon.

From the viewpoint of criteria 1, 3, 4, 5, 7, 8, and 9, it is recommended that electronics assembling technology for consumer products of category 3-C-(i) in the preceding section be chosen. Also, from the viewpoint of criteria 2, 3, 4, 6, and 7, it is recommended that technologies for agro-chemicals of category 3-C-(ii) in the preceding section be chosen.

1. The technology which is not specialized in a specific product, but covers common technologies for various products, because demand for specialized products is small in the early stage of market. In this respect, it is recommended that assembling technology for product mix be chosen.
2. The technology for which government can create demand. Because the demand is unstable in the early stage, it is recommended that technology related to infrastructure building be chosen.
3. A simple technology for the successful start of CIIRCTT. It is recommended that module type assembling technology not requiring too many facilities be chosen.
4. The technology which can be quickly commercialized for demonstration effect. It is recommended that proven technology even in other developing countries be chosen.
5. The technology which creates many jobs. It is recommended that the number of workers increase according to the production volume.
6. The technology which is closely linked with rural development. It is recommended that the technology for increasing the productivity in rural areas be chosen.

7. The technology which does not require high funds and sophisticated management. It is recommended that labor-intensive assembling technology be chosen.
8. Technology which has a ripple effect on the near future.
9. Technology which has been developed and/or adapted and tested to Cameroonian conditions, and which can be exported to neighboring countries.

VIII. Conclusions and Recommendations

The first choices of industrial projects are comparatively easy. For example, fertilizer plants are essential to expand agriculture. Manufacture of textile products is a traditional way to generate foreign exchange in developing economies. Oil refineries can reduce the cost of importing refined petroleum products.

But succeeding choices are more difficult. Investment capital is hard to find in a developing economy. Decisions on new industry that do not take proper account of world technology may commit financial resources to less productive ends. The roles of NOTT and the CIIRCTT will be to open a window on and develop an effective communication channel with world science and technology.

These organizations would, from the beginning, have to have a strong position in the aspects of legal, administrative and financial mechanisms in order to carry out their roles independent of political motivations, as discussed in the text.

It is recommended that the services and advice of international organization such as the United Nations Industrial Development Organization (UNIDO) should be sought early enough during the planning stages of both the NOTT and the CIIRCTT in order to benefit from their wide experience in this subject. The advice of experts from specialized industrial research institutions in other developing countries should also be sought. It is also recommended that the following preliminary activities be carried out prior to the start-up of the Institute:

Firstly, the training programme as outlined in the text should be implemented as soon as possible.

Secondly, detailed technical-economic surveys of industrial sectors should be conducted in order to develop information about Cameroonian industrial practices and appraise industrial utilization of world technology, to determine the existing and probable future research needs of Cameroonian industry which could possibly be fulfilled by the Institute, estimate the technical staff needs of the Institute for the next several years, and to determine the initial equipment and research facility needs of the Institute.

Appendix A. Proposed Law for the Promotion and Transfer of
Technology (DRAFT)

1. A National Office for Technology Transfer shall be established and managed by the NCTT under the aegis of the Delegation General for Scientific and Technical Research (DGRST).
2. There shall be entered in the Office all documents embodying contracts or agreements of any kind intended to have effect in the national territory and to govern:
 - (a) Supply of basic or detailed project study for the installation of the plant or equipment or for the manufacture of products;
 - (b) Furnishing of the technical expertise by means of drawings, diagrams, models, guidelines, instructions, specifications, personnel training and by other means;
 - (c) Grant of the use of patents or trademarks of any kind or authority to display them;
 - (d) Technical assistance in any form.
3. The following persons shall be obliged to apply for the registration of contracts or agreements under the foregoing article, if they intend to become parties to such contracts or agreements:
 - (a) Individuals or corporations of Cameroonian nationality;
 - (b) Foreigners residing in Cameroon and corporations of other than Cameroonian nationality established therein;
 - (c) Agencies or branches, established in Cameroon, of foreign firms;
 - (d) Joint ventures involving Cameroonian participation.
4. Documents embodying contracts or agreements as referred to in Article 2 shall be submitted to the NOTT for registration within thirty days after the date on which they are concluded.

They shall likewise be submitted to the NOTT within the period laid down in the previous paragraph such amendments as may be made to contracts or agreements as referred to in Article 2.

Where parties terminate such contracts or agreements before the date stipulated therein, notice thereof shall be given to NOTT within a like period of thirty days after the termination.

5. Contracts or agreements as referred to in Article 2, and amendments thereto, which have not been registered in the NOTT shall have no legal effect.
6. The NOTT may not register contracts or agreements as referred to in Article 2, in the cases of the following :
 - (a) Whereof the purpose is transfer of a technology readily obtainable in the country;
 - (b) Where the price is unreasonable to the acquired technology;
 - (c) Where clauses are included which enable the technology supplier to intervene in the management of buyer;
 - (d) Where restrictions are imposed on R and D by the technology buyer;
 - (e) Where there is tie-in conditions of purchasing equipment, tools and raw materials and selling of products and services;
 - (f) Where the export of goods or services produced by the technology buyer is prohibited in a way contrary to the interests of Cameroon;
 - (g) Where the period of validity is too long;
 - (h) Where disputes arising from the interpretation of the said contract or agreement are to be brought before or settled by a foreign court.
7. The NOTT may register contracts or agreements which fail to meet one or more of the requirements set out in the preceding article where the technology so transferred is of particular benefit to the country. There may be no derogation from the provisions of paragraphs (a), (b), and (h) of the preceding article.

The NOTT may request the modifications of the contract or agreement referred to in Article 2 about the following terms:

- (a) Terms of royalty amounts and payment;
- (b) The scope of the technology supplied;
- (c) Comparative analysis with other similar technologies of different sources;
- (d) Suitable training programmes;
- (e) Associate a local research and development organizations;
- (f) Management skills

The contract or agreement required to be recorded in the NOTT shall not include those concerned with:

- (a) Technical training provided by educational institutions, training centres;
- (b) Assistance for repairs in case of emergency, provided that it is furnished under a previously registered contract or agreement;
- (c) Admission of foreign technicians to install plant and machinery.

9. The NOTT shall decide within sixty days after receipt of the relevant documents whether contract or agreement referred to in Article 2 shall or shall not be registered in the Centre. If no decision has been taken before the expiry of that period, the contract or agreement in question shall be registered in the NOTT.
10. The NOTT may cancel the registration of a contract or agreement in the Centre if the terms of such a contract are changed or altered contrary to the provisions of this law.
11. Officials involved in the various operations relating to the NOTT shall maintain absolute secrecy with regard to technological information about contracts or agreements to be registered.

12. The NOTT shall accumulate regularly and constantly the documents embodying contracts or agreements including analysis report on the above contract or agreement, and conduct post-management study on the transferred technology.
13. Any person who considers his interests to be affected by a decision of NOTT under this law may, within sixty days from the date on which notice takes place, request a review of that decision and shall submit such evidence as he deems relevant. The application for review shall be submitted in writing to the NOTT.

Appendix B. Proposed Laws for the Cameroon Institute of
Industrial Technology, Consultancy and Technology Transfer

1. Purpose

The purpose of this law is to contribute to the promotion of science and technology, and the development of industries through the creation of Cameroon Institute of Industrial Research, Consultancy and Technology Transfer (hereinafter referred to as CIIRCTT) to be established for industrial management and technology transfer and their dissemination.

2. Subsidy

- (1) The Government may grant subsidy to meet the construction cost, operating expenses, and endowment for the operation of CIIRCTT;
- (2) Matters concerning the grant, use and administration of the Government subsidy under the provisions of the preceding paragraph shall be determined by Presidential Decree.

3. Loan of National Property

- (1) The Government may loan or transfer free of charge to the CIIRCTT such national property as may be required for the construction of the CIIRCTT office building;
- (2) Matters concerning contents, conditions and procedures of the loan or transfer under the provisions of the preceding paragraph shall be determined by Presidential Decree.

4. Business Plan

The CIIRCTT shall draw up its business plan every year and obtain the approval of DGRST therefor. The same shall apply to any alteration thereof.

5. Result Report

The CIIRCTT shall draw up a statement of business results and protocol of balance status every year and report them to DGRST within 2 months after termination of each business year.

6. Presentation of Materials

- (1) Government organizations, self-governing bodies, and public/private training institutions, and research institutes shall provide the CIIRCTT with three copies of technical reports, study and research papers, and other periodicals on science and technology.
- (2) Except those prescribed in the preceding paragraph, anyone who publishes scientific and technological publications shall inform the CIIRCTT of its publication within 30 days from the date of publication.

7. Enforcement Decree

Matters necessary for the enforcement of this law shall be determined by Presidential Decree.

Appendix C. Proposed Articles of the CIIRCTT

Articles of the CIIRCTT

Chapter 1. General Provision

Article 1 (Name)

The Centre shall be named the Cameroon Institute of Industrial Research, Consultancy and Technology Transfer.

Article 2 (Purpose)

The purpose of the Institute shall be the carrying out of the development and transfer of industrial management and technology, and their dissemination.

Article 3 (Functions)

The Institute shall undertake the following activities in order to achieve the purpose stated in Article 2.

1. Research, investigation, and examinations with respect to science and technology, engineering, economics and business management, and dissemination of the results.
2. Production technology development activities with respect to the above item 1.
3. Cooperation with universities and other educational or training institutions and other research organizations and professional societies in and out of Cameroon in the area of technology research, development and transfer.
4. Supplemental activities with respect to the above items.

Chapter II. Assets and Accounting

Article 4. (Fundamental Assets)

The fundamental assets of the Institute shall be provided by the Cameroon Government, that is, land, buildings, machinery, equipment, instruments, tools, books, and other related commodities and other property deemed by the decision of the Board of Trustees to be fundamental assets.

Article 5. (Disposal of Major Property)

The following property of the Institute shall not be transferred or mortgaged unless approved by the Board of Trustees.

1. Land and/or Buildings
2. Research machinery and instruments
3. Patents
4. Other major property specified by the Board of Trustees.

Article 6. (Source of Expenditure)

Expenditures of the Institute shall be met by the fundamental assets set forth in Article 4, service and other incomes, supporting funds and Government subsidy.

Article 7. (Business Year)

The business year of the Institute shall conform with the Government fiscal year.

Article 8. (Plan of Operation)

1. The Director-General of the Institute shall prepare operating and funding plans, and a budget several months prior to the beginning of each business year, and obtain the authorization of the Board of Trustees

2. In the event of revisions to the operating and funding plans, or budget, the Director-General of the Institute shall obtain the authorization of the Board of Trustees, unless the authority shall be delegated to the Director-General of the Institute by the provisions of the budget.

Article 9. (Settlement of Accounts)

The Director-General of the Institute shall, after the end of each business year, prepare a list of property, balance sheet, profit and loss statement, plan of surplus use, and business report, and obtain the authorization of the Board of Trustees annually.

Chapter III. Board of Management

Article 10. (Functions of the Board of Management)

The Board of Management shall resolve the following items:

1. Approval of yearly operational plan and budget;
2. Approval of the settlement of account;
3. Disposal of major property;
4. Loans;
5. Revision of the Articles;
6. Establishment of branch offices;
7. Establishment or revision of important regulations;
8. Other decisions in accordance with the Articles;
9. Other broad policies necessary for the operation of the Institute acknowledged by the Board of Management in addition to the above items.

Chapter IV. Research Review Committee

Article 11. (Research Review Committee)

There shall be a Research Review Committee in order to give advice to the Director-General of the Institute.

Article 12. (Functions of the Review Committee)

The following items shall be reviewed by the Research Review Committee:

1. Contracting of research activities
2. Selection of key research staff
3. Research expenditures
4. Other necessary matters with respect to research operations and activities.

Article 13. (Organization and Management of the Review Committee)

1. The Review Committee shall consist of the Director-General, Directors of Divisions, Project Managers, and other co-opted members, especially Directors of existing research institutions
2. The organization, management, and proceedings of the Review Committee shall be decided by the Review Committee.

Appendix D. Contacts made in Cameroon

Government

Mrs. Tankeu Elizabeth	Director of Planning Ministry of Planning and Economic Affairs
Mr. Ondoa Naah Sylvestre	Director of Technical Affairs + Planning Office of the Prime Minister President of NCTA
Mr. Bouba	Deputy-Director of Industries Ministry of Planning + Economic Affairs
Mr. Moume	Deputy-Director of Agriculture Ministry of Planning and Economic Affairs
Mr. Lionel Gwandua	Deputy-Director of Planning Ministry of Planning + Economic Affairs
Mr. Mandeng	Chief of Human Resources Unit Ministry of Planning + Economic Affairs
Mr. Nya Ngatchou	Director of Programme DGRST
Mr. Pani	Director of General Administration DGRST
Mr. Richard	Deputy-Director of General Administration DGRST
Mr. Nganjui	Technical Advisor DGRST
Mr. Atekwana	Technical Advisor DGRST
Mr. Andre-Ledoux Mekinds	Head of Investor's Assistance and Information Dept. Ministry of Planning + Economic Affairs

Industries

Mr. Christian Schmidburg	Director (Finance et Economic) CELLUCAM (Société Cellulose du Cameroun S.A.)
Mr. Horst A. Melzer	Administrateur délégué Directeur Général CELLUCAM
Mr. Paul Gerard Blanc	Service Commercial PLASTICAM, Douala
Mr. J.N. Ngu, F.C.C.A.	General Manager C.D.C. (Cameroon Development Corporation)
Mr. Teham Barthelemy	Director General de l'Equatoriale Electronique, Douala

U N I D O

Mr. George T. Tabah	Associate Industrial Development Officer
Mr. Patrick H. Willot	Junior Professional Officer in Yaounde
Mr. Luong-the-Sieu	Conseiller Industrial Principal UNIDO SIDFA, Yaounde

University

Ecole Polytechnique

Mr. Claude Marti	Director
Mr. Richard Digon	Deputy Director
Mr. Charlot Jean Jacques	Master of Conferences

Research Institutes

Mr. Ella Evina	Co-Director CENEEMA, Yaounde
Mr. J.P. Ekebil	Director Institute of Agronomic Research
Dr. Tebong	Director Institute of Zootechnical Research
Prof. Abondo Antoine	Director Institute of Medical Research and Medicinal Plants Studies
Mr. Soba Diallo	Director Institute of Geological and Mineral Research
Mr. Loung Felix	Director Institute of Social Sciences

Appendix E. Reference Documents

1. Law No. 65/LF/5 of 22nd May 1965 to set up the National Office for Scientific and Technical Research.
2. System of Investments: Investments Code of Cameroon as modified by Law No. 66/LF/5 of 10th June 1966.
3. Decree No. 74/347 of 16 April 1974 to amend Section V of Decree No. 72/710 of 14 December 1972 to organize the Ministry of Planning and Territorial Development.
4. Decree No. 74/358 of 17 April 1974 to set up the Council of Higher Education and Scientific and Technical Research.
5. Decree No. 74/538 of June 1974: Setting up the National Office for Scientific and Technical Research.
6. Decree No. 74/883 of 31 October 1974 to organize the Institute for Perennial Crops.
7. Decree No. 74/884 of 31 October 1974 to organize the Institute for Foodcrops and Textiles.
8. Decree No. 74/885 of 31 October 1974 to organize the Institute of Forestry and Inland Fisheries Research.
9. Decree No. 74/886 of 31 October 1974 to organize the Institute of Zootechnical, Pastoral and Veterinary Research.
10. Decree No. 74/887 of 31 October 1974 to organize the Institute of Hydrological Geological and Mining Research.
11. Decree No. 74/888 of 31 October 1974 to organize the Institute of Medical Research and Medical Plant Studies.
12. Decree No. 74/889 of 31 October 1974 to organize the Institute of Industrial and Technological Research.
13. Decree No. 74/890 of 31 October 1974 to organize the Institute of Human Science.
14. Decree No. 74/891 of 31 October 1974 to reorganize the National Institute of Education.
15. Decree No. 75/441 of 23 June 1975 to modify certain clauses of Decree No. 74/538 of 6 June 1974.

16. Decree No. 75/468 of 28 June 1975 to organize the Presidency of the Republic.
17. Decree No. 77/352 (a) of 1 September to amend the organization of the Presidency of the Republic.
18. Decree No. 78/109 of 1 April 1978 on the Establishment of the National Committee on the Transfer of Technology.
- 19.8 Decree No. 79/495 of 4 December 1979 to organize the Delegation General for Scientific and Technical Research.
20. Reports of Research Activities of
 - Institute of Human Science (1977 - 78)
 - Institute of Technological, Industrial and Mineral Resources (1977 - 78)
 - Institute of Agricultural and Forestry (1977 - 78)
 - Institute of Research on Oil and Oil seeds (1976)
21. Higher National Polytechnic School Prospects for 1979 - 82.
22. Cameroon Development Corporation Annual Report and Accounts for the 12 months ended 30th June 1979.
23. Fourth Five-Year Economic, Social and Cultural Development Plan (1976-1981), Ministry of Economic Affairs and Planning, Cameroon.
24. Implementation of the LIMA Declaration and Plan of Action (UNIDO).
25. Conceptual and Policy Framework for Appropriate Industrial Technology (UNIDO No. Monographs on Appropriate Industrial Technology).
26. Guidelines for Development of Industrial Technology in Asia and PACIFIC (U.N. Center, Bangkok, 1976).
27. Appropriate Industrial Technology for Agricultural Machinery and Implements (No. 4, Monographs on Appropriate Industrial Technology).
28. Guidelines for Project Evaluation (UNIDO Project Formulation and Evaluation Series No. 2).
29. Guidelines for Evaluation of Transfer of Technology Agreements (Development and Transfer of Technology Series No. 12).

30. National Approaches to the Acquisition of Technology (UNIDO, Development and Transfer of Technology, Series No. 2).
31. Manual for the Preparation of Industrial Feasibility Studies (UNIDO ID/206).
32. Korean Documents
 - Korean Science and Technology Informa Centre (KORSTIC), 1979
 - Technology Transfer Center, 1979
 - MOST (Ministry of Science and Technology), Organization and Function, 1979.
 - Articles of Korea Institute of Science and Technology.

