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ASSISTANCE TO AFRICAN COUNTRIES AND ORGANIZATIONS THROUGH THE PROVISION OF SHORT-TERM TECHNICAL ADVISORY SERVICES

XA/RAF/85/609/51-21-6

REGIONAL AFRICA

Terminal report

Prepared for the Governments of the countries participating in the regional project by the United Nations Industrial Development Organization

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Explanatory notes

Mention of dollars ($) refers to United States dollars.

In addition to the common abbreviations, symbols and terms, the following have been used in this report.

ARCEDEM	African Regional Centre for Engineering Design and Manufacturing
CARICOM	Caribbean Community
CCEAC	Communauté économique des Etats de l'Afrique Centrale/Economic Assistance to the Economic Community of Central African States (ECCAS)
CEAO	Communauté économique de l'Afrique de L'Ouest/Economic Community of West Africa
CEPGL	Communauté économique des Pays des Grands Lacs/Great Lakes Community
COMFAR	Computer Model for Feasibility Analysis and Reporting
CSIR	Council of Scientific and Industrial Research
ECOWAS	Economic Community of West African States
IDDA	Industrial Development Decade for Africa
IO/FEAS	Feasibility Studies Section, Division of Industrial Operations
IO/PLAN	Industrial Planning Section, Division of Industrial Operations
JPOs	Junior Professional Officers
NIC	National Investment Commission
NIOMR	Nigerian Institute for Oceanography and Marine Research
PADIS	Pan African Development Information System
PANAFTEL	Pan African Telecommunications Network
PATU	Pan African Telecommunications Union
PDEB	Programme Development and Evaluation Branch (UNIDO)
PTA	Preferential Trade Area for Eastern and Southern African States
PTTs	Postes et Télécommunications
RTIS	regional telecommunications information system
SADCC	Southern African Development Co-ordination Conference
SHP	small hydropower
SIDFAs	Senior Industrial Development Field Advisers
SOTED	Société Togolaise d'Etudes de Développement
UDEAC	Union douanière et économique de l'Afrique Centrale/Economic and Tariff Union of Central African States

Mention of the names of firms and commercial products does not imply endorsement by the United Nations Industrial Development Organization (UNIDO).

ABSTRACT

Among its activities for the Industrial Development Decade for Africa (IDDA), the United Nations Industrial Development Organization (UNIDO) was mandated by the General Assembly of the United Nations to undertake, beginning in 1985, a programme of technical advisory services for African countries. The project "Assistance to African countries and organizations through the provision of short-term technical advisory services" (XP/RAF/85/609) began in July 1985 and was completed in six months; funding was provided by the General Assembly when it allocated $5 million annually from the regular budget for IDDA activities. From an allocation of $600,000 for short-term technical advisory services, expenditure totalled $368,370 at the end of 1985.

The UNIDO programme involved presentations and demonstrations of various technologies which could be useful in African countries, and in formulating project possibilities to introduce such technological advances at the national, sub-regional or regional levels.

Seminars were organized involving UNIDO staff and other experts for the benefit of technical personnel, policy makers, and financial institutions etc. involved in African development, and a regional conference, involving 19 African countries and two regional bodies also took place on the development and manufacture of telecommunications equipment for Africa.

CONTENTS

INTRODUCTION

A. Project background

The main thrust of the Lagos Plan of Action, adopted by the Heads of States and Governments of the Organization of African Unity, was on the creation of self-reliant and self-sustaining integrated economic and social development at the national and transnational levels with the ultimate aim of satisfying the basic needs of the peoples of Africa. The Lagos Plan as well as the Final Act, accordingly, placed particular emphasis on economic co-operation at the sub-regional and regional levels for achieving these objectives. The industrial section of the Lagos Plan of Action was structured to make available the supply of the bulk of industrial inputs required for economic development and therefore emphasized the development of certain core industries such as agricultural, metallurgical, chemical, engineering etc. Since these industries often provided linkages to other sectors of the economy, the proposals for the formulation and implementation of the programme for the Industrial Development Decade for Africa (IDDA) were thus designed in accordance with the principles and priorities set out in the Lagos Plan. These proposals re-emphasized the integrated approach covering different industrial and allied activities taking due account of the linkages between these activities. The successful implementation of the programme for the decade called for the development of suitable institutional infrastructure and energy resources, the mobilization of financial resources, and the establishment or strengthening of appropriate industrial and technological capabilities to service and augment the industrialization process at the national and sub-regional levels.

In pursuance of these objectives and in order to take advantage of the experience gained by the United Nations Industrial Development Organization (UNIDO), particularly in 1984, in implementing the special allocation of $1 million by the General Assembly, a special provision was made by the General Assembly when it decided to allocate annually beginning in 1985, $5 million to UNIDO from the regular budget for IDDA technical advisory services to complement UNIDO expertise in responding to requests from African countries and inter-governmental organizations. This project - the short-term technical advisory services - was specially formulated to meet the obligations placed on UNIDO for providing short-term technical advisory services to countries in Africa in accordance with the guidelines provided in the IDDA programme for development of core industrial sub-sectors and support areas in harmony with other relevant projects being implemented by UNIDO in Africa. In its broad objective of assisting African countries and organizations in developing the industrial base, the project was conceived with a three-pronged approach to enable it to respond to the requests from the African countries and organizations in an expeditious manner, namely:

(a) Promotion and dissemination of information on basic technologies, especially those developed by and available to UNIDO;

(b) Diagnostic appraisal of industries requiring rehabilitation, maintenance, and promotion;

(c) Adjustment as well as development of industrial strategy, policy and institutional framework, particularly relating to planning, co-ordinating and monitoring the process of industrialization, development and utilization of personnel and technological capabilities as well as of their local energy and natural resources.

This terminal report on the project XA/RAF/85/609 is presented according to the classifications mentioned above, which have been dealt with independently.

B. The approach - project design

The main thrust of the project was placed on programme development; accordingly, the three components of the project were given the required orientation in implementation - the emphasis being placed on helping African countries to identify projects for technical co-operation by UNIDO within the ambit and priorities of IDDA. In pursuing these objectives, however, it was foreseen that maximum use would be made of in-house data, information and knowledge - from UNIDO as well as from the staff and consultants who have helped in successfully executing similar UNIDO technical co-operation projects elsewhere. This approach was considered the most cost-effective way of using the experience and knowledge available in the industrial sectors of specific relevance and interest to Africa. Accordingly, the programme for 1985 included:

(a) Presentations of basic technologies having a profound impact on the priority sectors of the economy; these included industries and industrial inputs into sectors such as food, agriculture, water management, housing etc.;

(b) Diagnostic appraisal of units having technical and commercial problems in functioning efficiently;

(c) Holding conferences to disseminate experience in technology transfer, development and integration of national technology policies with industrial development policies, as well as assistance in negotiating and evaluating agreements covering the transfer of technology.

The project was backstopped by the UNIDO Programme Development and Evaluation Branch (PDEB) and was launched in July 1985. The programme under (a) above was co-ordinated by PDEB, and through regular in-house consultations the project team utilized their experience and knowledge in specifying the pattern of coverage of various topics at a seminar and in demonstrations. The staff participated in making presentations on their specialization as well as in helping obtaining the services of consultants conversant with the UNIDO programme of technical co-operation in those areas. This section of the project accordingly benefited greatly from in-house experience. The programme focused on presenting and demonstrating basic technologies, and in turn on the industrial inputs which could make a significant contribution to development of industries such as food processing, agriculture and irrigation, storage of agricultural produce, housing, use of agricultural and municipal wastes for the generation of energy, and mini-hydro as a source of rural energy supply. Under (b) and (c) above, the programme was implemented by the respective specialist branches according to the normal practices followed in such technical co-operation projects.

C. Implementation

The project was first approved in June 1985; action on its implementation was launched immediately. In accordance with the design of the project, the first series of presentations and demonstrations began on 8 July 1985. During the six months allowed for the implementation of the project, eight countries in Central and Western Africa were covered by this programme and 19 African countries and two regional bodies participated in a regional conference on the development of manufacture of telecommunications equipment in Africa.

Presentations in each country brought together decision-makers from the national governments, industrialists, scientists from industrial research institutions and universities, financial institutions, and the representatives of industries from the developed and other developing countries. Together they outlined the application of basic technologies and scientific principles in the industrial development programmes of these countries and identified the immediate course of action that should be taken. Technical assistance from UNIDO (see chapter I) has been identified in a number of areas. The presentations in each country were attended by between 50 and 120 participants and given wide publicity by the national governments in their industrial promotion programmes.

The diagnostic appraisal programme has also helped identify technical assistance projects in Burkina Faso, Liberia and Rwanda. These projects need to be studied further, and details are available in chapter II.

Programmes on the transfer of technology, the elaboration of national plans for the industrial sector as well as in process evaluation were also undertaken during this period.

A list of the programmes under this project during 1985 is shown under the monitoring document (dated 22 January 1986) in annex I, which gives a summary of programmes implemented and the themes covered by each.

The sectors of industry covered at each presentation and demonstration programme are given in chapter I along with the recommendations pertaining to each sector. The important technical co-operation projects which have emerged out of these presentations and demonstrations on a national and sub-regional basis have been listed separately. A summary record of the text of presentations made on each subject is also given in chapter I.

I. PRESENTATIONS AND DEMONSTRATIONS OF BASIC TECHNOLOGIES

Programme coverage

Countries	Period
Central African Republic	8-12 July 1985
Congo	13-19 July 1985
Cameroon	22-26 July 1985
Sierra Leone	5-9 August 1985
Ghana	12-16 August 1985
Nigeria	16-23 September 1985
Guinea-Bissau	22-25 October 1985
Guinea (Conakry)	28 October-1 November 1985
Regional Africa (19 countries and two regional bodies)	6-11 January 1986

A. Scope and organization of the presentations and demonstrations

The preparatory work for the seminar and demonstrations to be undertaken during 1985 was taken up prior to the final approval of the project. As soon as the concept of the project was accepted in principle, PDEB undertook to prepare a background paper which would enable those responsible for the industrial development in the African States to identify the areas in which the UNIDO seminar and demonstration, designed as an aggressive approach to industrial development could be taken in the first instance. Field staff, namely Senior Industrial Development Field Advisers (SIDFAs) and Junior Professional Officers (JPOs), were also briefed on the concept, approach and the expectations of the programme. Because of the practical nature of the programme, various countries in Africa agreed that the seminar and demonstrations should monitor and assist in the industrial development in their countries. However, due to serious constraints on time, even those countries who responded promptly could not be accommodated in the 1985 programme. The seminar and demonstrations in countries in Africa were structured according to the guidelines given by the country concerned and the final programme was drawn up in consultation with the designated national counterpart agency.

The participants were first given a brief exposure to the activities of UNIDO, the components of UNIDO technical co-operation, and how it could be sought by the countries concerned. In order to give a bird's eye view of the financial aspects of technical co-operation, an overview of the various sources of funding available to UNIDO for its technical co-operation programmes was dealt with. The participants greatly appreciated the thrust of the technical components of UNIDO programmes because of their lack of bias.

Presentations on the main industrial subjects included the application of proven technologies, adaptation of the industries and products in these sectors to the environment and requirements of the developing countries, demonstration of the results achieved in similar industrial sectors in other developing countries, and the experience of UNIDO in the respective sectors in technical co-operation in other developing countries. The presentations accordingly used slides, films, charts and demonstration materials to bring about a better understanding of the technologies and the basic scientific principles involved as a means to industrial development.

A brief summary of each subject covered in these seminars is included in this chapter to provide a broad appreciation of the approach taken. It is impractical to include all the presentation material in this report, but UNIDO can be contacted should any specific queries arise.

The seminar and demonstrations generated a lot of interest among Governments, local United Nations Development Programme (UNDP) offices, as well as in the industry, research institutions and entrepreneurs. In some cases the media - TV, radio and newspapers - not only covered the seminar and demonstrations intensively, but also publicized it beforehand. The text of the speeches of the UNDP Resident Representatives and members of national governments are reproduced in annex II.

The recommendations on a country-wide basis for each subject presented are given in this chapter. Follow-up action in the form of technical co-operation has already been taken in some cases. Where specific national, sub-regional and regional projects have been identified as having high priority by the national authorities and regional bodies, they are listed separately.

B. Technologies covered by the programme

The technologies presented in each country covered by the programme of presentation and demonstrations were as follows:

Countries	Technologies presented and demonstrated
Central African Republic Congo Cameroon	(a) Processing and use of plastics in agriculture; (b) Production of building materials and storage silos for agricultural produce; (c) Application of bentonite and perlite in agriculture.
Sierra Leone Ghana	(a) Processing and use of plastics in agriculture; (b) Processing of natural rubber; (c) Application of bentonite and perlite in agriculture; (d) Production of fishing equipment, fish processing, and storage; (e) Energy-efficient building and composite materials through organic and inorganic polymers.
Nigeria	(a) Processing and use of plastics in agriculture, water management, and storage of food grains; (b) Processing and use of natural rubber; (c) Energy efficient building and composite materials through organic and inorganic polymers; (d) Production of fishing equipment, fish processing, and storage.
Guinea-Bissau Guinea (Conakry)	(a) Development and application of mini hydro-power plants; (b) Processing of meat and fish; (c) Use of agricultural waste and biomass for the generation of energy; (d) Energy efficient building and composite materials through organic and inorganic polymers; (e) Development and manufacture of agricultural machinery and implements.

Regional Africa (UNIDO in collaboration with the Pan African Telecommunications Union (PATU) of the Organization of African Unity (OAU) and under the aegis of the Government of Zimbabwe)	Prospects for the manufacture of telecommunications equipment in Africa.

A summary of each technology presented and demonstrated under this programme is enclosed, under the following heads:

(a) Processing and use of plastics in agriculture;

(b) Production of building materials and of storage silos for agricultural produce; and of energy efficient building and composite materials through organic and inorganic polymers;

(c) Processing of natural rubber;

(d) Fish processing, storage, and production of fishing equipment; and meat processing;

(e) Development and application of mini hydro-electric power plants;

(f) Use of agricultural waste and biomass for energy generation;

(g) Development and manufacture of agricultural machinery and implements;

(h) Application of bentonite and perlite in agriculture;

(i) Telecommunications industry:

(i) The use of repair and maintenance facilities as a means of beginning the manufacture of telecommunications equipment;

(ii) Changing technologies from electromechanical to electronic switching systems - problems and options within the African context;

(iii) Design, contracting and management of projects in order to enhance local participation in their realization;

(iv) Possibilities for the manufacture of specific components of a telecommunications system;

(v) Possibilities of regional co-operation in areas such as standardization, the regional manufacture of equipment and components, and the formulation of manufacturing joint ventures.

C. Summary of technologies presented and demonstrated

1. Processing and use of plastics in agriculture

The presentation brought out the extensive use of plastics in agriculture through a simple drip irrigation system (ETA), mulching, lining of canals and waterways, grain storage etc., which could easily be adapted to the requirements

of developing countries with subsequent outstanding advantages to the economy. The results of the various technical assistance programmes successfully implemented by UNIDO were presented which highlighted the development of plastic industries in many countries as well as the application of plastics in agriculture and water management. Examples were provided of the saving of water of up to 40 to 50 per cent through a simple drip irrigation system while increasing yields by 60 to 300 per cent. The high increase in the yields of fruits and vegetables by the use of mulching film and drip irrigation were shown. The simple methods of drip irrigation which could be adapted to heavy soils and enabled to reach the plant roots were discussed on the basis of actual experience gained in different countries, including those in Africa.

The systems of drip irrigation in which capital is minimized and with virtually no input of energy (achieved by the use of a windmill to pump water to a storage tank at a higher level for feeding to the drip irrigation system) were of great relevance to Africa. Such systems operating in different developing and developed countries were described in detail. The comparative performance of a farm partly employing plastics with the remaining part left to conventional agricultural practices was demonstrated by showing the growth of plants at different stages. The high mortality rate in the conventional system against a virtually 100 per cent success in plantations employing plastics was shown through actual case studies in both developing and developed countries.

The lining of canals and waterways with plastic film by methods suited to the quality of soils as well as in sandy areas was presented and the techniques of sealing joints in a simple manner were explained.

The reduction of post-harvest losses by storing the produce using plastic film was explained by showing the simple methods used in providing these facilities, even to a small farmer, in the form of "Pusa" bins. The conceptual designs for the following systems were provided:

(a) Drying of food grains in the field using polyethylene film;

(b) ETA irrigation system;

(c) Biogas digester cum-holder on a Brazilian model;

(d) Pusa bins for storage of food grains;

(e) Underground storage of food grains on a Brazilian model.

The advantages of plasticulture in the context of the African situation were highlighted. Throughout the presentations, emphasis was laid on the local production of all the systems and components from plastic resins. The indigenization of all the materials required for such systems is feasible and UNIDO could assist countries in Africa if so required. The UNIDO presentation was usually followed by a brief presentation by a representative of the local agricultural extension institution. The advantages of preventing loss of cowbeans (estimated at around 30 to 35 per cent) were highlighted by the local institution in Nigeria. This has been successfully achieved by storage in locally produced black plastic bags of 50 kg capacity. This showed the large potential for using plastics in grain storage which greatly depends upon extension work and the involvement of the farmer in the development of the system to be designed for such applications. After discussions it was concluded that the use of plastics in various agricultural applications is of great relevance to the situation in Africa and it should be encouraged.

Efforts should also be made to adapt to the African countries the techniques successfully employed by UNIDO in other developing countries with similar conditions and infrastructure.

In brief, the most important applications of particular relevance to the countries covered during the 1985 programme were:

(a) Grain storage: Post-harvest losses of food grains in most countries were high, up to 40 per cent. The opportunities for constructing relatively inexpensive storage silos from plastic film for the small farming sector was considered most appropriate for follow-up purposes;

(b) Rain water harvesting: In view of the seasonal variations of rain in the country, the possibility of employing plastics for rain water harvesting was seen as an important household use;

(c) Packaging: Bulk packaging especially for products such as cement, coffee, cocoa and rice;

(d) Farming sector: It was recognized that mulching with plastic film was an interesting farming technique which should be encouraged in an agricultural development programme. The technique holds good promise for the cultivation of cash crops such as pineapples, citrus fruits etc.;

(e) Irrigation and water management: The application of plastic film linings for canals and reservoirs interested most countries with respect to their development programmes undertaken in farm consolidation and irrigation sectors.

2. Production of building materials and storage silos for agricultural produce; and of energy efficient building and composite materials through organic and inorganic polymers

The presentation dealt extensively with the possibilities of producing composite materials with organic and inorganic polymers. These materials, if properly designed, could have properties far superior to their constituents and can be designed to utilize locally available fibrous materials with a variety of continuous matrices. The technological concepts were identical to those employed in sophisticated applications such as space and aeroplanes, but this technology could be adapted for use in the developing countries by maximizing equipment and machinery for its manufacture from local resources. The results of laboratory work in the production of polymerized clays using a solar heating system were presented and the samples of bricks and the composite materials produced with these low energy processes were displayed. The advantages of composites using a small quantity of thermoset resin, reinforcement with polypropylene and glass fibres were spelled out. The low energy input in these materials in relation to traditional materials was emphasized. Developments related to the use of composite materials employing local raw materials such as fibres and the binders, for panelling and roofing sheets, were demonstrated.

The use of composite materials, mainly glass-fibre reinforced polyester for making collapsible silos for grain storage as well as for low-cost housing developed under a UNIDO sponsored project was demonstrated. The housing colonies established under these projects in Cyprus, Ecuador, Mexico and Uruguay were dealt with in detail, and covered flexibility in design, architectural features and advantages of low weight, higher degree of safety, and security. The exciting possibilities of using clay matrix in composite materials in the future were discussed.

It was also mentioned that the production of bricks by the solar heating system could be investigated for application in Africa as it will allow for the possibilities of dispersal of this industry by minimizing transportation costs.

The UNIDO presentation was usually followed by a presentation by a representative from the National Building Research Institute. It emphasized that cement is a basic commodity in almost all countries, and that it is essential to the infrastructural industrial and social development. The demand for cement is higher than its production and accordingly, both the use and production of cement has to be maximized. The work on composite building materials is being carried out at some research institutions and in the universities. It was concluded that a number of countries in Africa provided a great potential for the development of composite materials, more particularly their use in the building industry. The facilities in the universities and the building research institutes could be complemented in order to carry out further development work. There would be a distinct advantage for the African countries in obtaining assistance and technical help from the Free University of Brussels, through UNIDO.

3. Processing of natural rubber

The presentation covered the technologies employed in the production of rubber, processing of rubber, and the use of rubber in a variety of products. World-wide developments, including UNIDO-sponsored projects, which have promoted use of natural rubber in competition with synthetics were highlighted. The need for enforcing stricter quality control measures in the production of natural rubber in Nigeria were emphasized. A variety of products that can be advantageously produced from latex by rubber-producing countries such as Ghana and Nigeria were discussed in the context of similar developments in Malaysia. The large potentialities of thermoplastic rubbers, developed under a UNIDO-sponsored project, for a variety of end-users, because of unique properties that natural rubber acquired in admixture with polypropylene were presented in detail. Thermoplastic rubber production in the world has already reached around 500,000 tonnes per annum, and natural rubber-producing countries in Africa such as Nigeria could be well placed to produce it from wholly indigenous raw materials when its polypropylene plants come on stream. The technologies for the production of powder rubber and its potential uses were explained. The recent technological achievements of the UNIDO project in Côte d'Ivoire for the production of liquid natural rubber were discussed, and its potential as well as the course of further developmental work which has to be undertaken were presented.

The UNIDO presentation in Nigeria was followed by a detailed presentation of the status of the rubber and rubber-processing industry by representatives of the Rubber Research Institute of Nigeria. It was mentioned that Nigeria imported a large volume of rubber products, including pre-mixed compounded rubber, much of which is used in the manufacture of tyres.

It was concluded that with a population of 80 to 90 million people, the potential market is large enough to support a prosperous rubber manufacturing industry, which, in addition to the domestic market could also cater to the markets of neighbouring countries. The progressive expansion of the industry could be based largely on Nigeria's own natural resources, of which natural rubber is of great importance. The production of other raw materials, e.g. synthetic rubber, carbon black, zinc oxide etc., used in rubber products manufacture in Nigeria, should be encouraged as raw materials for these are available within the country. Similarly, powder and thermoplastic natural

rubbers are of great promise in Nigeria as these provided the possibility of manufacturing products using modern but less capital intensive plant and equipment.

It also appears essential to set up a centre to provide access to prospective entrepreneurs in Nigeria and access to information on all aspects of rubber product manufacture, i.e. raw materials, equipment, sources of supplies, processing techniques, compound formulations, sources and arrangements covering transfer of technology etc.

4. Fish processing, storage, and production of fishing equipment; and meat processing

Fish processing - The presentation dealt with various parameters such as the type of fish available, differences between fresh water and sea-water fish processing, requirements of salting, smoking etc. to be defined for a fish processing plant. The processing, including smoking, marinating, deep freezing and canning, was explained through flow diagrams. The operation of a simple 10 tonnes/day manually operated fish processing plant was explained. The details of such equipment as a scaling machine and a head-cutting machine were illustrated.

The important features of a fish processing plant and the factors to be taken into account for its establishment were itemized. The flexibility of a fish processing plant in terms of various operations such as the production of deep frozen or smoked fish were spelled out.

Meat processing - The presentation showed the variations in types of equipment, number of production lines, mixed and segregated lines with respect to the capacity of a meat processing plant as well as the availability of livestock. It was emphasized that the linkage of the plant to appropriate animal breeding, availability of adequately skilled staff as well as the necessary infrastructure was essential for the establishment of a meat processing plant. The parameters of the layout of meat processing plants covering processing, services, energy supply, water and sewage treatment and administrative facilities were demonstrated. The processing of meat from slaughterhouses to cold storage was shown by layout plans and slides. The equipment used in processing and its adaptability to maximizing the manual operations was explained, emphasizing the most important equipment which should form the nucleus of a processing plant. The cold storage facilities as well as the low temperature system in processing were explained, especially in the context of the cooling medium used and the levels of temperature attained in different parts of the plant and the intermediate storage areas. The characteristics and the essential components for setting up a meat processing plant in a developing country under tropical conditions were summarized. The presentation was based on a paper, "Possibilitiés de traitement de la viande de bétail en Afrique".

The subsequent discussions related to the extension of existing meat processing plants as well as details about the operation of cold storage facilities. Specific questions were also raised regarding the production of different products, such as the processing of liver, cooking and smoking of sausages, and conservation of various meat products.

5. Development and application of mini hydro-electric power plants

The presentation on the development and application of mini hydro-electric power plants covered various aspects relating to electro-mechanical equipment, types of turbines, layout of the plant, technical design, technology, installation, protection, and switch gear equipment employed. The presentation brought out the wide spectrum of possibilities under which different water heads can be used to generate power in mini and small power plants. The details and application of the equipment as well as the complete system of hydropower was presented through slides, illustrations, circuit diagrams and transparencies. The costing and techno-economic consideration for various capacities of power plants were emphasized in great detail. The criteria for selection of potential sites for the development of mini hydropower plants were also explained. A paper, "Création et utilisation des minicentrales hydro-électriques", was distributed among the participants.

The discussion that followed the presentation mainly related to the identification of potential sites, techno-economic evaluation of the sites and the applicability of the economic criteria to the local conditions. The participants emphasized that there are a number of rivers in various countries but because of the geographic conditions, the heads available are rather low.

The main concern related to:

(a) The design of a system which would be able to meet the local hydrological characteristics and at the same time be economically attractive;

(b) The problems in diverting water from the main stream, the amount of civil engineering work, the approach, accessibility, the reservoir, and the site for turbines, which should be so selected as to obtain the maximum head of water.

The participants inquired whether UNIDO could provide assistance in selecting suitable sites for mini hydropower plants.

6. Use of agricultural waste and biomass for energy generation

The presentation highlighted the types of biomass fuels and the processes available for their conversion to useful energy, in particular, technologies for the improved production of charcoal and the use of gasifiers and wood-fired boilers. The potential for UNIDO involved in biofuel development was also referred to. A paper, "Idées de projets pour la mise en valeur des combustibles biologiques", was distributed among the participants.

The first issue raised in the ensuing discussion concerned the socio-economic issues involved in the development of a biofuel programme. It was pointed out that much of the technology is new and experience with its widespread use is still limited. Consequently, it is difficult to address these issues adequately in a definitive manner. Examples of projects concerned with the promotion of new designs of efficient cooking stoves and charcoal kilns were presented. The issue of the production of either ethanol or sugar from sugar cane was also raised. It was pointed out that under African conditions it may be more appropriate to produce sugar as well as alcohol from molasses. The viability of alcohol production and its use as a source of energy, greatly depends upon the energy input in raising the sugar cane crop and in all probability, under African conditions, the energy output from alcohol would be more than the energy required for the sugar cane crop.

Interest was also shown in the relative efficiencies of gasifiers and steam cycle systems. It was pointed out that in the size range below 100 kW, gasifier systems were both cheaper and more efficient, and sufficient operating experience with gasifiers in this size range was available to justify pursuing activities using this technology.

Concern was also expressed about the potential for deforestation which occurs as a result of the extensive use of the forestry resources for energy purposes. It was made clear that UNIDO did not support activities which would lead to further deforestation. Rather, it encouraged the use of more efficient processes for the use of wood as a fuel and the production and use of charcoal.

A special interest in co-operation with UNIDO was expressed by a private entrepreneur who operated a sawmill and furniture manufacturing facility about 120 km from Bissau. The total capacity of this plant included the cutting of 2,000 m^3 of roundwood per year. It generated wood waste at a rate of approximately 20 tonnes per day. This included slabs from the sawing process and also branches 40 cm in diameter which were left in the forest. The entrepreneur expressed strong interest in developing a project to utilize the wood waste which is currently being generated, for the production of charcoal for export. The UNIDO team was able to supply the participants with some technical information about the processes available. Similar proposals emerged in Guinea, the only other country covered by this programme on this subject.

7. Development and manufacture of agricultural machinery and implements

In introducing this topic, some general information was presented about the reasons for the need for increased local production of agricultural machinery, basically to grow more crops to cope with the projected increase in population, and to avoid spending money abroad. Of the four broad-based categories of agricultural machinery manufacture, only the first two (simple and intermediate) would be applicable to satisfy the immediate local needs which consisted of simple agricultural tools, animal-drawn implements, manually operated equipment and low-cost power-drawn machinery and implements. However, the following preparatory measures must be taken, before initiating local production:

(a) Identification of the required products including their specifications;

(b) Evaluation of the expected demand in numbers;

(c) Design development and testing of the appropriate prototype equipment and machinery;

(d) Training in production methods, repair and maintenance of agricultural tools and implements as well as their quality control.

The importance of the promotion of handicrafts (blacksmith shop) and small- or medium-scale industries in a programme for rural development was stressed, as this leads to an improvement in social and economic conditions. Such decentralized production units, linked to a central workshop, would slow down the migration of labour from rural to urban industrial areas.

The essential design development and adaptation activities were emphasized in combination with quality control and performance evaluation. Such a programme necessitates:

(a) Identification of specific items which need to be manufactured;

(b) Analysis of existing facilities;

(c) Formulation of relevant project for implementation.

Production units, classified by technological levels, were described in detail. For the pertinent family type (one to five persons) and small- or medium-scale (30 to 200 persons) the specific product range was also enumerated. Manufacturing profiles of these two industry levels covered only a few of the most-used hand tools.

8. Application of bentonite and perlite in agriculture

The application of bentonite was of potential interest in the regions of Africa which have sandy soils and suffered seasonal water shortages. The main question was whether there were bentonite deposits in the country which could be economically used for soil conditioning.

Bentonite is an aluminosilicate which is derived from volcanic rocks and consists mainly of montmorillonite with sorptive, ion-exchange, binding, catalytic, electrostatic, dispersive and filling properties, as well as the capacity to create new crystalline phases. These properties make the mineral versatile in its application in the fields of agriculture, building and construction, and chemical industries, as well as in waste water treatment and purification.

Bentonite, perlite, tuffs, tuffites, zeolites and marls are essential non-metallic rocks that have proven uses in agriculture - mainly in soil reclamation and conditioning, increased crop yields etc. Bentonite has the unique advantage of being inexpensive, needs no special pre-treatment or upgrading for agriculture, and needs to be applied only once every seven to ten years. For increased crop yields, 15 to 20 tonnes per hectare of bentonite is applied to sandy soils. The use of bentonite in soil conditioning and enhanced crop yields reduces irrigation water consumption of crops by approximately one half.

There are no known bentonite deposits in the west African countries covered during the 1985 programme, because of the absence of volcanic activity, but they abound in other African countries such as Egypt. The only known use of bentonite in some of the countries visited was based on imports. However, the use of bentonite in agriculture should be explored by agricultural research organizations as a possible means of combating the southward advance of the Sahelian desert.

9. Telecommunications industry

(i) The use of repair and maintenance facilities as a means of beginning the manufacture of telecommunications equipment

The presentation reviewed in detail the approach to repair and maintenance. It placed emphasis on the maintenance phases required to rectify failures in a telecommunications network. A typical maintenance operation was discussed at its various levels, starting with local level replacement of faulty parts, and

proceeding to central stores and workshops for the repair of equipment. Based on the maintenance approach and the facilities reviewed, the following possibilities were identified for the production of spare parts:

(a) Small-scale production at existing workshops with a certain stock of machine tools;

(b) Assembly of equipment from components;

(c) Establishment of multipurpose production units which manufacture small batches of a variety of spare parts for existing equipment and installations.

An appraisal was presented of the conditions necessary for a practical approach to the manufacture of spare parts. These emphasized the need to evaluate the demand for spare parts, the establishment of linkages with suppliers of the original equipment and with national industries in allied fields, and the need to obtain licences and standardized equipment.

The presentation concluded by summarizing the issues under this topic, as follows:

- The need for regular maintenance.
- The need to ensure adequate spare part inventories for new exchanges.
- The dynamic role of multipurpose production units in local production of spare parts.
- The importance of training in maintenance as well as that of maintenance facilities as a means of beginning the manufacture of telecommunications equipment.

The seminar concluded that repair and maintenance was an activity which needed continuous attention. The situation of repair and maintenance was, however, complicated in African circumstances, by the non-availability of spare parts due to outdated equipment often made for other regions. Furthermore, it was recognized that repair and maintenance offered the prospects for the manufacture of telecommunications equipment, starting initially with the fabrication of spare parts.

(ii) Changing technologies from electromechanical to electronic switching systems - problems and options within the African context

According to International Telecommunications Union (ITU) statistics, the viable production in Africa of electronic switching equipment might not be possible for some time to come. However, the production of small private exchanges and their modification for public applications involving capacities of between 100 and 1,000 lines seemed reasonable. The purpose of those exchanges would be to satisfy rural public switching needs. The models adopted should be modular and flexible so as to satisfy PABX needs, accommodating capacities of between 10 and 50 lines, as well as being suitable for other applications.

The production of electromechanical equipment, limited mainly to assembly, and requiring the purchase of parts, would be feasible but might run counter to the network development objectives of the countries concerned. Assuming that electromechanical exchanges would continue to be used for another 30 to

50 years, it would be reasonable to consider producing electromechanical equipment. The current production of such equipment in Algeria, Egypt, Kenya and Zimbabwe was noted.

The manufacture of telephone sets could be viable at the regional level. They are currently being produced in Algeria, Egypt, Kenya, Sudan, Tunisia, Zambia and Zimbabwe.

The limited production of multiplex equipment, preferably combined with the production of single-channel radio equipment, was possible at the regional level. It was noted that such equipment has been produced in Egypt.

The large and immediate demand for sophisticated components prevented their production in the region. However, basic components such as relays, could be suitable for production, both as spare parts for the repair and maintenance of existing equipment and for export, since they required a large supply of labour and raw materials. In conclusion, attention was drawn to the importance of maintaining a spirit of compromise if a viable regional industry were to be developed.

The participants noted the irreversible movement towards electronic switching. At the same time, however, the existing stock of electromechanical exchanges would have to be kept in service for as long as possible. Action was therefore called for at three levels:

- Maintenance, repair and replacement of components.

- Planning for the introduction of electronic technology.

- Study of the compatibility of the two types of systems during the transition period.

This difficult situation called for action to be co-ordinated both at the national level, among all concerned (administrations, research and development institutions and industries), and at the regional or subregional level. There was also an urgent need for training planners and operators.

Given the potentials and uncertainties of tomorrow, decision-makers must consider the options open to them today, never forgetting that the most appropriate technology for any country was the one which enabled it to make the best possible use of its human, material and financial resources.

(iii) <u>Design, contracting and management of projects in order to enhance local participation in their realization</u>

The presentation relied on experience in Portugal to illustrate the issues under this topic. Three points were elaborated:

(a) The manufacture of telecommunications equipment in Portugal began in the 1930s, commencing with small, simple items and transmission equipment and later progressing to electromechanical switching equipment;

(b) The experience thus acquired was used to develop the manufacture of digital equipment, again starting with simple transmission equipment and graduating to switching equipment;

(c) Finally, in areas in which local know-how did not exist, participation in manufacture was initiated by using a significant quantity of locally produced simple supplemental equipment;

(d) This experience was used to begin the manufacture of digital equipment, again starting with simple transmission equipment and graduating to switching equipment;

(e) Finally, again in areas in which local know-how did not exist, participation in manufacture was initiated by using a significant quantity of locally produced simple supplemental equipment.

It was stressed that this evolution was due to an emphasis being placed on such critical factors as:

- Training, to provide the necessary human resources.

- Planning, in order to forecast market demand.

- Specifications, which would allow for the installation of the proper equipment.

- Time devoted to the preparation of specifications, planning and co-ordination of the inputs of the various contractors, before actually implementing the project.

The purchase of technology in the form of logical sub-groups rather than a single package proved to have beneficial effect since it allowed for higher participation of local staff, thereby providing a major source of training and contributing to the preparation of maintenance procedures. Even if projects required higher initial capital investment, technology unpackaging would allow for low overall investment and direct operating costs, as compared to turnkey operations. Further, it allowed for a higher integration of local equipment and other less sophisticated equipment from supporting industrial branches in the telecommunications network. Finally, it catered for systems which were more appropriate to local requirements.

The presentation concluded by stressing the importance of training, planning, and the organization of manufacture and services in order to be able to acquire technology in the form of well-defined components.

The presentation clearly elaborated the point that turnkey projects do not stimulate the utilization of local skills, the transfer of technology, or the maximum use of local resources.

There was a need for well-defined specifications for telecommunications projects. It was established that information already existed in the region, and sometimes in neighbouring countries, and it should be used in preparing specifications.

Proper specifications formed a crucial starting point for elaborating and negotiating contracts. Time spent on preparing for project work in detail was well rewarded by benefits in timely completion as well as in savings in costs.

(iv) <u>Possibilities for the manufacture of specific components of a telecommunications system</u>

The presentation highlighted various aspects of a telecommunications project and the sub-system of a telecommunications network. It indicated investments in each sub-system in terms of material and installation.

Given the number of telephones in Africa, even with optimistic growth rates, the requirement of telecommunications equipment for individual

countries would be such that no viable modern telecommunications equipment manufacturing plant could be set up unless some regional/sub-regional co-operation was resorted to in manufacture.

Referring to the "Maitland Report", the presentation highlighted the fact that design, development and manufacturing efforts in developing countries should be devoted to adapting already existing equipment, in order to make it more suitable to their environment.

Various stages were identified in the design, development and manufacture of telecommunications equipment as well as the support industries required. In this connection, the importance of standardization was stressed to enable regional co-operation in setting up manufacturing industries.

Finally, India's development of telecommunications industries was presented as an example of step-by-step development. The country's experience in design, development and manufacture was depicted and the methods adopted by India in the absorption of new technologies were also presented.

Materials and equipment amount to about 60 per cent of a new telecommunications project. This consists of switching equipment, cables, transmission equipment, and power plant. The remaining 40 per cent comprises the cost of buildings, installation, testing, and commissioning.

High traffic switching equipment is available from large corporations in the developed countries. Low traffic equipment is being developed in several developing countries as well as in developed countries.

The technology for the manufacture of transmission equipment and cables is available from a number of sources, both in developed and developing countries. The availability of large quantities of copper in a number of African countries provides an exclusive opportunity to manufacture conventional cables and wires, particularly in those countries in Africa which are well placed for export. This manufacture would have to be associated with setting up of a well-designed marketing strategy and network. The manufacturing plant could include the manufacture of both electrical and telecommunications cables and wires.

A large number of items essential for telecommunications equipment are produced in industries and processes such as mechanical and electrical engineering works, sheet metal works, extrusion, pressing, die casting, moulding, and galvanizing facilities. Such industrial processes are installed in practically all African countries, hence various components and fittings could be manufactured in the region.

The existing low telephone density, as well as low penetration, even at liberal rates of growth (around 10 per cent per year), would restrict the establishment of large plants for switching equipment in individual countries. The main avenue for resolving this constraint would be in regional or sub-regional co-operation and planned efforts for rationalized manufacture and acquisition of equipment by African countries.

(v) Possibilities of regional co-operation in areas such as standardization, the regional manufacture of equipment and components, and the formulation of manufacturing joint ventures

The presentation dealt with the institutional structures for co-operation that existed in Africa at the regional level through institutions such as Communauté économique de l'Afrique de l'Ouest/Economic Community of West Africa (CEAO), Communauté économique des Etats de L'Afrique Centrale/Economic Assistance to the Economic Community of Central African States (CCEAC), Communauté économique des Pays des Grands Lacs/Great Lakes Community (CEPGL), Preferential Trade Area for Eastern and Southern African States (PTA), Southern African Development Co-ordination Conference (SADCC), Union douanière et économique de l'Afrique Centrale/Economic and Tarif Union of Central African States (UDEAC) etc.

It recalled the objectives of the Lagos Plan of Action with respect to the communications sector and industrialization for the development of its infrastructure, and offered a series of technical, financial, and economic arguments in favour of regional industrial co-operation in this sector.

The regional possibilities for the establishment of local industries were analysed, taking into account foreseeable requirements and the need to create economically viable industries. This analysis showed that:

(a) A small number of countries (eight) could engage in national production of telephone stations and exchanges;

(b) The other countries (42) should form groups for joint ventures to manufacture the same type of equipment;

(c) In general, the economically viable production of cables was possible only through joint ventures by groups of States.

It suggested that the countries in the first category should act as a nuclei around which the countries of the same category should be grouped. This would help avoid economic risks and could promote a better utilization of the existing infrastructure.

The presentation stressed the role that co-operating organizations could play in the formation of groups, the implementation of common industrial policies, marketing etc.

It suggested other possible fields of co-operation, such as:

- Research and development, through the creation of regional and sub-regional centres which might specialize in specific areas. Such centres might also be called upon to perform expert functions, including the preparation of specifications, testing and monitoring etc.

- The exchange of information among telecommunications administrations. Emphasis was laid on the strategic importance of information and its effects on the choice of technologies and the commissioning of systems.

The participants, while appreciating the existing mechanisms of co-operation in operation among the African States, stressed the need to further strengthen these mechanisms for the benefit of the region.

It was concluded that appropriate studies would be useful in enabling decisions to be taken on the establishment of production units. Emphasis was laid on the time factor as there was an urgent need to find industrial solutions to the telecommunications situation in Africa.

The participants emphasized the need for standardization, the means of achieving it, and referred to the role that ITU and PATU could play in that area.

There was a need for establishing in PATU a system for the collection and dissemination of technical information, for which assistance may be sought from UNIDO. It was also suggested that the possibilities of the PADIS system in the Economic Community for Africa (ECA) should be studied and utilized as appropriate.

Emphasis was also laid on the need to develop regional co-operation in training.

D. Recommendations

The recommendations of each presentation and demonstration are given below for each country separately:

1. Central African Republic

(a) Processing and use of plastics in agriculture;

(b) Production of building materials and storage silos for agricultural produce;

(c) Application of bentonite and perlite in agriculture.

- With respect to composite materials and building materials, establish a pilot research and experimentation centre for composite materials used for construction.

- Continue an intensive co-operation with UNIDO with regard to financial, practical and technical assistance for strengthening the Research Centre for Building Materials which operates under the "Direction général des travaux publics et de l'aménagement de territoire".

- Special emphasis should be given to industrial documentation and information which would enable the country to establish a data bank on building materials.

2. Congo

(a) Processing and use of plastics in agriculture;

(b) Production of building materials and storage silos for agricultural produce.

- Establish a technical dossier giving detailed information on various techniques and possible uses of plastics in agriculture.

- Create an experimental unit which would deal also with products storage and distribution.

The following priority market outlets were identified:

(i) Gardening-nursing bags, drip irrigation, breaker sheets;
(ii) Water storage;
(iii) Irrigation;
(iv) Plastic covers for breeding;
(v) Testing cultivation without soil in the research centres;
(vi) Grains silos and composite building materials.

(a) Grain silos - Participants called for demonstrations on the installation of public and private silos;

(b) Composite building materials - In view of the high cost of metal and concrete in the Congo, the participants recommended the use of burnt bricks produced locally, using local fuel resources. Assistance was also requested in the use of polymers together with local building materials, including clay. Co-operation should be sought in this field with the Free University of Brussels.

3. Cameroon

(a) Processing and use of plastics in agriculture;

(b) Production of building materials and storage silos for agricultural produce;

(c) Application of bentonite and perlite in agriculture;

Profound interest was expressed in the local production of mobile silos for agricultural produce. There was a specific request for assistance in planning such production facilities.

4. Sierra Leone

(a) Processing and use of plastics in agriculture

A programme of demonstrations of the application of plastic films in agriculture should be organized by the government, involving the Ministries of Trade and Industry, Agriculture and Natural Resources using infrastructure provided by the Growth Centres programme and other relevant development programmes. UNIDO could provide assistance in the specification of films to be used and the design and application of films to be employed for specific purposes.

(b) Processing of natural rubber

The main area of UNIDO assistance lay in the possibility of producing rubber articles and rubber compounds using domestic resources which were being exported.

- In this connection, UNIDO was requested to undertake a programme composed of four elements:

(a) Assessing demand for rubber compounds from local industries such as tyre retreading;

(b) Assessing the total production of rubber in the country;

(c) Assessing the production facilities that would be required to transform domestically available rubber into the required compounds;

(d) Realization of a pilot plant which could transform the rubber available into rubber compounds for domestic utilization.

(c) Application of bentonite and perlite in agriculture

- The Ministry of Mines (Geological Survey Department) should investigate the extent of clays and their montmorillonitic content in Sierra Leone in order that samples could be obtained for analysis by the UNIDO/Czechoslovakia Joint Programme.

- Should there be a possibility of applying montmorillonitic clays and other sorbents, technical assistance could be provided through the UNIDO/Czechoslovakia Joint Programme for the application of these mineral sorbents for soil improvement and amelioration in Sierra Leone.

(d) Production of fishing equipment, fish processing and storage

- UNIDO should provide assistance for the domestic manufacture of fishing equipment, particularly fish nets, for the artesanal sector.

- UNIDO should provide assistance in relocating the deep-freezing, storage and other facilities at the integrated fishmeal plant to a more suitable location so that it could be fully utilized for fish processing.

- The fishmeal equipment in this plant could be utilized for fishmeal production, for which there is adequate demand, using the catch of non-commercially acceptable species, i.e. balistes.

- There is a need for training in fish processing at various levels, especially in the area of fish smoking in the industrial and artesanal sectors.

(e) Energy-efficient building and composite materials through organic and inorganic polymers

- An advisory service should be provided to assess the optimization of clay and industrial brickmaking in existing facilities in the country.

- A programme should be devised for the development of low energy methods of producing bricks from composite materials. The programme should attempt to enhance the possibilities of rural brickmaking in small-scale units. The programme should consist of:

(a) Laboratory investigations of bricks from composites based on clays from Sierra Leone;

(b) Testing of such bricks against conventional alternatives;

(c) Devising the most appropriate manufacturing techniques for these bricks in rural areas;

(d) Training in the chemical and manufacturing aspects of this technology.

- During the course of the seminar, a UNIDO team visited the Sierra Leone Petroleum Refining Company Ltd. During the course of discussions the following areas of assistance were identified:

(a) UNIDO should assist in the short-term training of supervisory personnel through appropriate courses in refining processes;

(b) UNIDO should assist in strengthening training facilities in the refinery by organizing regular training programmes for operators, maintenance and safety personnel;

(c) Lubrication oils are presently imported and used lubrication oils are being collected and used mainly as fuel in the industrial brick kiln. The possibility of employing suitable proven technologies for recycling used lubrication oils should be considered. This would not only help the country to conserve foreign exchange, but also reduce environmental pollution caused by the disposal of waste lubrication oils not used as fuel for the brick kiln.

5. Ghana

(a) Processing and use of plastics in agriculture

- It is recommended that the Ministry of Agriculture, in conjunction with other concerned Ghanaian departments and research organizations, establish a committee to promote the applications of plastics in agriculture and water management. The objective would be to assess the social costs and benefits of this technology in the country's agricultural development strategy. To this end it is further recommended that the Government permits imports of the required quantities of raw materials, e.g. plastic granules, for these demonstrations.

- UNIDO could, on request, provide appropriate technical assistance to further this development.

(b) Processing of natural rubber

- A thorough investigation of local raw materials must be conducted with the aim of replacing, as far as possible, the imported inputs in the rubber industry, e.g. carbon black. This can be done through co-operation between UNIDO, CSIR, and the rubber industry in Ghana.

- The use of rubberized coconut fibres should be seriously considered, although it may not be an exportable material.

(c) Application of bentonite and perlite in agriculture

- The Geological Survey Department and the Ministry of Lands and Natural Resources should explore the possible existence of bentonite, perlite and other sorbent deposits in Ghana.

- Samples of such rocks and other clays should be sent to the UNIDO/Czechoslovakia Joint Programme, in Pilsen, for the determination of their physico-chemical properties and for the evaluation of potential industrial and agricultural applicability. Further laboratory and field experimentation on the applicability of bentonites, perlites etc. to agriculture, should be carried out in Ghana.

- The UNIDO/Czechoslovakia Joint Programme should provide technical assistance and other information to Ghana on the transfer and implementation of technologies involving the use of such clays.

- In recognizing the fact that bentonites and perlites have a broad spectrum of uses in industry and agriculture, the possibility of their importation from neighbouring countries should be considered if found to be economically viable.

(d) Production of fishing equipment, fish processing and storage

- UNIDO should be asked to provide training and study tours to Ghanaian and Liberian personnel in the fishing industry on integrated shore fishing complexes, including fish preservation techniques, packaging, and fish offal utilization.

- UNIDO should be asked to provide technical assistance in the revitalization of industrial fish-processing plants in Ghana.

- UNIDO should be asked to provide assistance to Liberia in setting up an appropriate fish-processing plant.

- The Governments of Ghana and Liberia should encourage the establishment of small-scale processing plants and fish-holding facilities for artisanal fisheries so that fish handling and preservation could be improved in rural areas. Furthermore, it is recommended that a network be established between these facilities and marketing centres. This would contribute significantly to the economic welfare of remote coastal communities in both countries. The assistance of UNIDO should be sought towards this end.

- The Governments of Ghana and Liberia should encourage the domestic manufacture and maintenance of fishing nets and fishing gear. UNIDO should assist the CSIR and other relevant bodies in assessing the main causes of failure of outboard motors in artisanal fisheries in Ghana.

- UNIDO should be requested to provide technical assistance in the use of local fuels for the curing and smoking of fish.

(e) Energy-efficient building and composite materials through organic and inorganic polymers

- The assistance of UNIDO should be sought in rehabilitating the operations of the existing public sector brick plant by instituting quality control and performance improvement.

- UNIDO should be asked to organize and execute a developmental programme, including demonstration facilities in Ghana, for the application of polymerized clays in brick-making as well as composites in roofing materials.

- Samples of clays from Ghana will be provided for analysis and examination in Belgium for the production of bricks based on the technology demonstrated.

- UNIDO should be asked to promote the refractory industry, starting with the preparation of a pre-feasibility study on the local manufacture of refractories, particularly those that are commonly used, and those that have future potential demand.

- UNIDO should be asked to assist in the further development of the process of pozzolana manufacture by setting up a suitable pilot plant.

6. Nigeria

(a) Processing and use of plastics in agriculture, water management and storage of food grains

- Assistance from UNIDO should be sought for training local personnel in plastic processing and use of plastics in agriculture.

- A forum, comprising processors, agriculturalists and the concerned government agencies needs to be created in the form of a national committee for the promotion of the use of plastics in agriculture. The committee would examine the technical and economic relevance of the use of plastics in agriculture, and in view of its importance to the economy and to farmers, examine what steps could be taken in the form of fiscal or other incentives. UNIDO might be requested to provide the reports of similar committees in other developing countries.

- The national committee on the use of plastics in agriculture should seek UNIDO assistance for employing these concepts on demonstration farms in Nigeria; these would then be used for extension schemes to help farmers.

(b) Processing and use of natural rubber

A detailed survey, with assistance from UNIDO in the form of expert advice, should be carried to:

(a) Identify imported rubber products and the size and structure of the existing rubber products industry;

(b) Draw up a list of current and future requirements of industrial and consumer products in Nigeria;

(c) Identify products which could be produced from both latex and raw rubber in Nigeria for local and African markets;

(d) Prepare a list of the raw materials needed for manufacturing programmes; and their availability from local sources. Products should be identified for which at least 70 per cent of the raw materials are available locally.

Technical assistance should be sought from UNIDO for:

(a) Training Nigerian technical personnel in the industrial practices of rubber/polymer technology and in the design and production of rubber processing and testing equipment;

(b) Identifying the equipment and manufacturing technology appropriate for the production of rubber products of priority to the Nigerian economy, and for which major raw materials are available locally.

(c) Energy-efficient building and composite materials through organic and inorganic polymers

- In view of the outstanding work done by UNIDO in the field of composite materials which can, among others, be employed in building construction,

the Government of Nigeria urges UNIDO, in conjunction with ECA, to help it promote the development of new building materials from locally available materials, especially in the development of cement substitutes such as lime and pozzolana. Assistance from UNIDO should also be sought for setting up a pilot-cum-demonstration plant for the production of these materials.

- The Government should seek UNIDO assistance in training local personnel in the development of new building materials.

(d) Production of fishing equipment, fish processing, and storage

- The Government should provide transportation and the necessary infrastructure for fish processing in rural areas in order to minimize the losses of fish production by artisanal fishermen

- The Government should enforce quality control measures by involving all the government agencies concerned.

- The Government should give adequate incentives (fiscal and non-fiscal) to attract the private sector into the fishing industry.

- The Government should ask UNIDO to prepare an inventory of new technologies in fish processing and storage, which should be made available to the Federal Ministry of Science and Technology.

- UNIDO technical assistance should be sought to:

(a) Train the Nigerian personnel in the industrial practices of fish processing and storage by improving and upgrading the facilities already existing in the Nigerian Institute for Oceanography and Marine Research (NIOMR), Federal Ministry of Science and Technology.

(b) Identify in collaboration with NIOMR the package of equipment and manufacturing technology appropriate for fish processing and storage in Nigeria.

7. Guinea-Bissau

(a) Development and application of mini hydro-power plants

UNIDO should be asked to undertake a detailed survey of the opportunities for the development of mini hydro-power plants and for a techno-economic evaluation of the potential sites. Due consideration should be given to such factors as geography, climate, temperature and rainfall patterns in the area, as well as the actual and future requirements.

(b) Processing of meat and fish

Assistance from UNIDO should be sought for improving the operation of an existing slaughterhouse with a capacity of 30 pigs per day, as well as the feasibility of the extension of this plant, taking into account the availability of livestock and infrastructure.

- Assistance from UNIDO should be sought on a short-term basis for technical advice on reducing the waste in the two existing fish-processing plants.

- UNIDO should be asked to provide technical training for personnel from the existing fish-processing plants in the fields of processing, deep freezing and preservation of fish products.

(c) Use of agricultural waste and biomass for the generation of energy

UNIDO should be asked for assistance in assessing the opportunities for agricultural waste and biomass for the generation of energy.

(d) Energy-efficient building and composite materials through organic and inorganic polymers

- Short-term technical assistance should be sought from UNIDO for improving the performance of the existing brick plant in Bafata, especially in the fields of quality control, raw material characterization, and improving the operation of machines and reduction in down time.

- Training should be undertaken of local technical personnel in conventional brick-making plants in countries employing equivalent technologies such as Brazil and Czechoslovakia. The training should be extended to personnel who will form the nucleus of the construction materials unit in the Ministry of Industry.

- UNIDO should be asked to provide opportunities to local personnel to acquire more technical knowledge in the field of new construction materials which have been developed at the Free University of Brussels. This could be achieved by allowing personnel to participate in the seminars organized at Brussels on the subject.

8. Guinea (Conakry)

(a) Development and application of mini hydro-power plants

- Obtain assistance from UNIDO in rural electrification by installing mini hydro-power stations at various places.

- Investigate if assistance from UNDP could be made available in the selection of sites as well as electro-mechanical equipment, by recommending which technology is best suited for the country, with special emphasis on turbines, generators and switchgear equipment.

- Verify whether UNIDO assistance could be availabe in the initial planning and designing stage, and in selecting standardized equipment so that the costs would be considerably lower for the installation of two or more mini hydro-power stations.

(b) Processing of meat and fish

Assistance from UNIDO should be sought for improving the operation of an existing slaughterhouse with a capacity of 30 pigs per day, as well as the feasibility of the extension of this plant, taking into account the availability of livestock and infrastructure.

- Assistance from UNIDO should be sought on a short-term basis for technical advice on reducing the waste in the two existing fish-processing plants.

- UNIDO should be asked to provide technical training for personnel from the existing fish-processing plants in the fields of processing, deep freezingand preservation of fish products.

(c) Use of agricultural waste and biomass for generation of energy

Technical assistance from UNIDO in developing a biogas generation system. Work in the field is already being done at the National Research Centre, at Bogbane, and adequate laboratory facilities and scientific personnel form the basis for this work. The Minister of Scientific Research requested the help of UNIDO in developmental work which should include setting up a digester and associated analytical facilities.

(d) Energy-efficient building and composite materials through organic and inorganic polymers

- Assistance should be obtained from UNIDO for a project involving low-cost housing to be undertaken in Guinea. The development programme should also undertake the production of self-supporting roofs.

- UNIDO should be asked to provide technical and practical training for a group of technical personnel from Guinea in the production of polymer clays and composite materials.

- With the assistance of UNIDO, the various soils in Guinea should be analysed to establish if polymerized clays could be produced from local clays.

(e) Development and manufacture of agricultural machinery and implements

Using the Centre Pilot as a technological centre and pilot engineering workshop, and adding a small foundry, power press and miscellaneous equipment and instruments, it was recommended that:

(a) Applied research was carried out to facilitate the design, adaptation and development of agricultural machinery and implements;

(b) Approved prototypes were developed and manufactured;

(c) Foreign designs of agricultural machinery were adapted;

(d) Consultancy services on designing and testing were offered;

(e) The Centre acted as a link with other national and international institutions.

9. Regional Africa

(UNIDO in collaboration with the Pan African Telecommunications Union of OAU and under the aegis of the Government of Zimbabwe)

The theme of the presentation was "Prospects for the manufacture of telecommunications equipment in Africa".

(a) Use of repair and maintenance facilities as a means of beginning the manufacture of telecommunications equipment

Given the lack of environmental testing of facilities and adaptation/design efforts to tropicalize telecommunications and other

electronic equipment to African conditions, UNIDO should be asked to provide assistance in the establishment of a Regional Environmental Test Centre and a Regional Tropicalization Centre along the following lines:

(a) Objectives

- To provide environmental testing (temperature, humidity, salt spray, vibration, shock etc.) facilities for purchased and locally designed and/or adapted telecommunications and other electronic equipment.

- To act as a focal point for information on environmental specifications, standards, test procedures.

- To advise countries of the region on practical aspects of tropicalization.

- To develop appropriate low-cost tropicalization techniques, materials and processes.

- To certify equipment according to tropical operating conditions.

(b) Background

Severe environmental conditions in Africa necessitate the application of special design and manufacturing techniques in the production of telecommunications equipment. Special consideration should also be given to:

- Preparation of specifications.
- Selection/acceptance tests.
- Design/adaptation.
- Operation of the telecommunications equipment. The cost and technical/technological skill involved in the establishment and operation of such centres justifying a regional approach.

(c) Project formulation phases

- Project concept - draft (UNIDO).
- Review by interested regional or sub-regional bodies.
- Submission of requests by Governments through UNDP to UNIDO.
- Preparatory assistance by UNIDO and selection of location of centres.
- Finalization of project document (UNIDO, Governments, regional organizations, donor agencies).
- Implementation.

Further, UNIDO was asked to assist African countries in the establishment of pilot repair and maintenance workshops and to rehabilitate existing workshops, placing emphasis on the training of repair and maintenance staff. In addition, three multipurpose pilot workshops should be established in three African countries to demonstrate the prospects for multipurpose production in the following areas:

- Electromechanics.
- Electronics.
- Metalworking.

(b) Changing technologies from electromechanical to electronic switching systems: problems and options within the African context

- With respect to the continued use of electromechanical equipment, an inventory should be compiled of the quantitative and qualitative requirements for the components of electromagnetic exchanges. In addition, production units should be created at the national, sub-regional, or regional levels for the components selected in the study.

- With respect to the compatibility of different systems, a study should be made of the needs for appropriate interfaces. Furthermore, R and D centres need to be created and co-ordination structures should be established on the basis of existing and new centres. This effort should be geared towards ensuring the reliability of new equipment and the need to develop the interfaces.

- With respect to the digitalization of small capacities (20 to 50 lines), a study should be undertaken on the needs for connection units; a pilot project should also be established for the production of the relevant equipment.

- With respect to the procurement of small private and public electronic exchanges, a study should be made on the modification of a standard PABX for public applications, and a sub-regional or regional production unit should be set up for the manufacture of small electronic exchanges.

- When considering the importance of solar energy in Africa and its relevance to telecommunications, especially to rural telecommunications, every effort should be made to increase the utilization of this form of energy in the telecommunications sector.

(c) Design, contracting, and management of projects in order to enhance local participation in their realization

- Projects in this sector should be elaborated by the respective Postes et Télécommunications (PTTs) with well-defined responsibilities and a planned co-ordination of inputs provided by the various agents. Careful project specifications would favour local participation in relatively simple aspects such as civil works, sheet-metal components etc. Project specifications should also concentrate on a clear evaluation of technical assistance requirements for project implementation.

- In the event that sources of telecommunications project specifications are not available to the PTT, the services of independent experts should be employed for project preparation. Such assistance could be provided by UNIDO and ITU.

(d) Possibilities for the manufacture of specific components of the telecommunications system

- Several African countries, with the co-operation of ITU, have prepared master plans for the development of telecommunications, while other countries are in an advanced stage of preparation. Assistance from UNIDO and PATU should be sought to identify projects which could be taken up on a sub-regional or regional basis, relying on the statistics available in these plans. PATU and the regional economic organizations

should take the initiative of seeking UNIDO assistance in analysing and interpreting the available master plans, or those expected to be available, and undertake the compilation of the remaining information required to identify manufacturing opportunities.

- Given the variety of standards followed by different countries in the region, a gradual approach to standardizing the equipment used in Africa and more particularly in contiguous States should be initiated. This action is expected to make a significant contribution to obtaining spare parts and components from neighbouring countries in the event of emergencies, and make sub-regional manufacture as well as regional co-operation technically and economically viable. Sub-regional economic organizations such as PTA, Economic Community of West African States (ECOWAS), and SADCC in co-operation with PATU, should initiate steps to create sub-regional frameworks for the telecommunications industry. The technical assistance required from UNIDO in the creation of such networks may be sought by the sub-regional economic groupings.

- UNIDO should carry out feasibility studies for setting up manufacturing industries in the African countries on a national or a sub-regional basis. Action was taken in the seminar to prepare a directory of industries available in the electronics and telecommunications field in African countries. This could be continued with UNIDO assistance in order to provide readily available information for planned growth and in setting up new industries in African countries.

(e) Possibilities of regional co-operation in areas such as standardization, the regional manufacture of equipment and components, and the formulation of manufacturing joint ventures

It was recommended that PATU undertake to consolidate information on:

(a) Current production in African countries;

(b) Details of existing industrial projects;

(c) Estimates of the requirements of telecommunications equipment in Africa over a period of 10 to 15 years;

(d) Developing new project proposals setting out conditions for implementation of multinational projects in consultation with existing organizations engaged in industrial development through co-operation in Africa.

It was also recommended that a regional telecommunications information system (RTIS) should be set up in PATU with the assistance of UNIDO. The system could also include information on the R and D in the sector.

10. Technical co-operation projects

The programme of seminar and demonstrations helped put forward a number of other projects which could be considered by UNIDO for technical co-operation both at the national and regional levels. Some of the most important are shown below:

National level

Projects	Countries
Production of collapsible silos for storage of food grains. (The project in Cameroon has since made much progress; a feasibility study has been prepared by a UNIDO consultant and the Government has already accorded it high priority as well as the necessary funds for setting up manufacturing facilities).	Cameroon, Ghana, Nigeria
Debottlenecking of the meat- and fish-processing units.	Guinea-Bissau, Guinea (Conakry)
Performance improvement and instituting quality control measures for brick-kiln plants.	Central African Republic, Ghana, Sierra Leone
Diversification of product pattern of rubber processing units and plastics processing industries.	Ghana, Nigeria, Sierra Leone
Pilot demonstration plant for synthetic fibres.	Nigeria
Assistance in the establishment of product design for a newly formed company for the manufacture of telecommunications equipment.	Zimbabwe

Regional level

Setting up a demonstration facility for an increase in the yield of agricultural produce, vegetables, and cash crops by the use of plastics and plasticulture. Ghana, Guinea, Nigeria and Sierra Leone have sought the establishment of such demonstration facilities. The establishment of this facility could be supported by the Plastics Technology Centre set up with UNIDO assistance in Alexandria, Egypt, as well as with know-how available from UNIDO.

Setting up pilot facilities for compounding natural rubber in order to demonstrate the production of thermo-plastic rubbers as well as promote the production of compounded rubber locally. Ghana, Guinea and Nigeria have expressed a desire to participate in the programme. This project will be an offshoot of a UNIDO-assisted development in the use of natural rubber for the production of thermoplastic rubber materials.

Establishing demonstration facilities for the production of low-cost construction materials for housing through the use of solar energy for the production of inorganic and organic polymeric materials. The innovative use of modern scientific principles for grassroots developments have aroused keen interest in all the countries covered in the programme. Ghana has offered to provide assistance to set up a model house using the construction materials - bricks - produced by this technology. The technology developed at the Free University of Brussels, with UNIDO support, holds great promise for application in Africa.

Establishing regional centres for environmental testing and for the tropicalization of the telecommunications equipment on a regional or sub-regional basis. This will help the countries to acquire understanding of the technology in this field and enable them to specify and procure the equipment suitable for local conditions. It will also promote the possibilities of local manufacture in due course.

Establishment of three multipurpose workshops for telecommunications equipment in three African countries in order to promote the prospects of multipurpose production in the fields of electromechanics, electronics, and metalworking.

The programme on the telecommunications sector, although the last to be initiated, has made considerable progress. The regional level projects have already received support from the Annual Consultative Conference on SADCC Ministers of Industries, during their meeting at Harare, on 30 and 31 January 1986. These proposals were also presented to the PATU 3rd Conference of Plenipotentiaries, which met from 4 to 7 March 1986. They were fully endorsed for early implementation. The elaborated proposals will be presented to a meeting of international experts who will assist UNIDO in preparing them for consideration at a Donor's meeting.

The seminar and demonstration on the telecommunications industry, held at Harare, evoked considerable interest from many leading foreign enterprises as well as participants from developed and developing countries. In view of the realistic recommendations they have shown keen interest in financing as well as joint-venture manufacturing programmes.

II. DIAGNOSTIC APPRAISAL OF EXISTING UNITS AND DISSEMINATION OF TECHNOLOGY TRANSFER

The short-term technical advisory services project had a three-pronged approach: the programme relating to "presentations and demonstration" as a means of developing UNIDO programme of technical co-operation has already been covered. This chapter covers the projects covered by the two programmes relating broadly to maintenance, rehabilitation, and industrial strategies, policies, technological personnel development, institutional mechanisms, and the development of energy resources.

A list of projects undertaken in accordance with these activities is given below and is followed by a summary of each project. The summaries provide a brief description of the project objectives and the important recommendations that emerged from the project's implementation.

List of projects undertaken through short-term "technical advisory services"

Project No.	Title	Place and date
1.	Dissemination of information on the development of a natural liquid rubber pilot plant	Abidjan, Côte d'Ivoire 9-12 May 1985
2.	Seminar on maintenance and post investment	Rabat, Morocco 15-17 May 1985
3.	National Technology Days	Yaounde, Cameroon 18 June to 4 July 1985
4.	Establishment of a pilot investment foundry at the African Regional Centre for Engineering Design and Manufacturing (ARCEDEM)	Ibadan, Nigeria 10-11 June 1985
5.	Workshop and demonstration of appropriate technologies and equipment for metallurgical industries	Katowice, Poland 25-29 August 1985
6.	Establishment of a pilot demonstration plant for vaccine production	Garoua, Cameroon 27 October to 3 November 1985
7.	Fourth All-Africa Trade Fair	Lomé, Togo 18-30 November 1985
8.	Expert Group Meeting for the establishment of an African regional network for small hydropower development	Addis Ababa, Ethiopia 18-22 November 1985
9.	Establishment and strengthening of the training capacity and capability in the field of design and production of agricultural machinery and implements for Africa	Cameroon, Sudan and United Republic of Tanzania July to October 1985
10.	Feasibility study on the establishment of a pilot unit for manufacturing, erecting, and putting into operation mobile low-cost silos known as "FLEXILOS", for the storage of agricultural products	Yaounde, Cameroon 15 December 1985 to 6 February 1986

Project No.	Title	Place and date
11.	Mini hydropower projects in the Republic of Guinea	Gueckedou region, Guinea 23 December 1985 to 23 February 1986
12.	Preparation of IDDA workshops on the industrial strategy for the Central African Republic and Zaire	Bangui, Central African Republic 1-5 April 1986
13.	Identification and preparation of technical assistance projects for the IDDA programme in Ethiopia	Addis Ababa, Ethiopia November 1985
14.	Rehabilitation of existing enterprises, diagnosis and direct management assistance	Liberia January to April 1986
15.	Diagnosis of industrial enterprises in difficult situations	Burkina Faso 21 January to 20 April 1986

Project No. 1: Dissemination of information on the development of a natural liquid rubber pilot plant

Objectives

(a) To disseminate information on the setting up of a pilot plant for the development of the industrial composite materials;

(b) To provide a forum for discussion and for the exchange of ideas in the field of liquid natural rubber.

Recommendations

(a) The possibility of establishing in Côte d'Ivoire a Centre for Applied Research and Training in Rubber;

(b) A new project for a rubber drying unit to be set up in Côte d'Ivoire. A draft project document will be prepared and submitted to UNIDO by the Government of Côte d'Ivoire;

(c) With respect to Guayule, a project document is already in preparation, and Burkina Faso, Gabon and Morocco are interested. An official request will shortly be sent to UNIDO.

Project No. 2: Seminar on post-investment and maintenance

Objectives

(a) A better awareness of the benefits of the adequate use and maintenance of existing capital;

(b) Improvement of the level of maintenance in all the economic sectors;

(c) Encouragement to the users and maintenance agents through incentives etc.

Recommendations

(a) Post-investment is one of the most important factors for the definition of a new industrial strategy;

(b) Because of the total amount of debt in the country investment has declined considerably and a number of projects have been cancelled. It was recommended that finances should be efficiently managed to enable the country to develop a small range of industries which were more effective than larger enterprises;

(c) Provide the necessary information on training to foster a new generation of technicians who would work as well as teach their co-workers;

(d) Maintenance is an important field of international co-operation and the system should allow the exchange of technology between developed and developing countries;

(e) A comprehensive report should be specifically prepared that should serve as a model for the same activity in other African countries planning to hold a similar project at a national level. It should be noted that at present the question of maintenance is of concern and a priority matter of African countries.

Project No. 3:. National Technology Days

Objectives

(a) The project was designed to assist the Government of Cameroon in strengthening its technological capability for the negotiation and evaluation of technology transfer agreements. The project aimed at identifying and defining the institutional arrangements necessary for the transfer or acquisition of technology;

(b) National Technology Week was an opportunity to assess at first hand what the country was doing in research and development, and in promoting the development of indigenous technologies based on the utilization of natural resources;

(c) The seminar permitted the participants to identify areas that still needed to be tackled within the technology development and transfer process.

Recommendations

(a) Establishment of a national mechanism for the registration and evaluation of contractual arrangements relating to the acquisition of foreign technology, as well as improvement of terms and conditions for the acquisition of foreign technologies;

(b) Need for a national service (office) for collection, compilation and dissemination of information on indigenously developed technologies as well as on sources and profiles of foreign technologies;

(c) Need for an institution for quality control and standardization.

Project No. 4: Establishment of a pilot investment foundry at ARCEDEM

Objectives

(a) To determine the method of operation and technical orientation of a pilot investment foundry, within the structure and objectives of ARCEDEM;

(b) Determine the requirements for assistance and orientation which may be required by ARCEDEM.

Recommendations

(a) Prototype development

UNIDO should assist by identifying institutions in other countries engaged in this activity;

(b) Establishment of foundry services for commercial production activities coupled with training and prototype development

A small pilot foundry would be indispensable (utilizing an oil-fired rotary furnace instead of a cupola furnace operated on imported coke), together with a casting line investment and ceramic mould types in order to produce cast moulds for wax injection, plastic, glass and metal working, and for the production of quality castings;

(c) Development of production methods

These should be developed through study tours and short, specific, training programmes;

(d) Expert assistance

A programme of expert assistance should be developed which is directed at productive activities. Only short-term experts will be required;

(e) Market survey

ARCEDEM should be requested to make the first contacts with prospective clients and to obtain details of their requirements. These could be studied by an expert team during a month-long mission to Ibadan and Lagos; the product lines could then be defined;

(f) ARCEDEM specifically requested assistance for the establishment of a small, plastic injection workshop.

Project No. 5: Workshop and demonstration of appropriate technologies and equipment for metallurgical industries

Objectives

(a) To organize a workshop and study visits in Katowice, Poland, for participants from ten African countries in order to review and assess the selection and use of appropriate technology and equipment relating to the metal-processing industry;

(b) To establish contacts for transfer of technology and industrial co-operation between the participants of the workshop and manufacturing and consulting organizations;

(c) To discuss ways and means of practical implementation of industrial co-operation between partners from Africa and Polish enterprises in selected fields of metal processing.

Recommendations

(a) Technical assistance and co-operation in the development of iron ore deposits in Algeria;

(b) Technical assistance in carrying out research and pre-feasibility studies for the development of the existing mineral resources in Cameroon;

(c) Technical assistance in the development of an urgently needed mechanical workshop for manufacturing spare parts as well as valves and fittings in Morocco;

(d) Technical assistance in maintenance services for plants to be rehabilitated in Mozambique;

(e) Consulting services and technical assistance in pre-feasibility and marketing studies for the establishment of a system for local spare parts manufacturing plants in Mozambique;

(f) Technical assistance for further development of small-scale industrial units in the Maputo region and Beira province, Mozambique;

(g) Technical assistance and co-operation in the further development of the existing iron ore mines and processing plants in Liberia;

(h) Technical assistance in establishing and implementing in Kenya and Zimbabwe the horizontal continuous casting processes for bars and bushes made of non-ferrous metals;

(i) Assistance in pre-feasibility studies concerning the development of the iron ore deposits both in the western and eastern provinces of Kenya;

(j) Assistance in establishing a spare parts manufacturing plant for the motor and textile industries in Kenya;

(k) Technical assistance in establishing cable manufacturing plants as well as industrial scales and pumps production units in Morocco.

Project No. 6: Establishment of a pilot demonstration plant for vaccine production

Objectives

(a) To assist the Government in the finalization of the preparatory phase of the establishment of a national quality control laboratory and discussing the length of the training programme as a part of the sub-contract;

(b) To finalize the list of equipment required for the project as part of the sub-contract with detailed specifications and cost.

Recommendations

(a) New facilities should be established for long-term production of human measles vaccines, tetanus, and other vaccines;

(b) Support should be obtained from various parties such as the Government of the Netherlands, World Bank etc., provided that well-documented project descriptions are forwarded in which the feasibility of the project is clearly demonstrated;

(c) On the basis of a detailed project description, the terms of reference should be formulated for all parties;

(d) Preparation of personnel requirements for the production and control of various types of bacterial and viral vaccines for human use.

Project No. 7: Fourth All-African Trade Fair

Objectives

(a) Presentation of UNIDO feasibility studies activities, including Computer Model for Feasibility Analysis and Reporting (COMFAR), at the Fourth All African Trade Fair, held at Lomé. Several organizations from various countries were invited to obtain further information on hardware and software as well as on how training workshops could be organized and financed in conjunction with UNIDO;

(b) Participation of a number of African technological institutions in presenting and demonstrating the technologies developed by them in the food-processing area in order to promote these among other African countries.

Recommendation

In view of the great interest shown at the Trade Fair, it was recommended that Feasibility Studies Section, Division of Industrial Operations (IO/FEAS) was more actively involved in regional and national exhibitions and fairs in developing countries involving UNIDO.

Project No. 8: Expert Group Meeting for the establishment of an African regional network for small hydropower development

Objectives

(a) To discuss and formulate a general framework for a network mechanism for small hydropower development (SHP) in Africa, and the modalities of its operation;

(b) To identify priority problems at the national level which could form the basis of a general work programme of a regional network;

(c) To agree on a plan of action for establishing an African regional network for small hydropower, with the support and co-operation of African countries which already have in operation national programmes on small hydropower, as well as those that are ready to start such activities.

Recommendations

(a) The importance and potentiality of SHP for power production and integrated rural development should be brought to the attention of policy-makers in deciding priorities in national development. This can often best be

achieved through regional and international collaborative reports and information exchange;

(b) In promoting SHP maximum exposure should be given to its successful development and application in other developing countries and regions through the use of television and other media. The authorities responsible for SHP development in Africa should consider the preparation of their own promotional material, including videos;

(c) For the proper assessment of SHP projects, the social benefits must be clearly identified and efforts made to quantify them. In this respect, a proper methodology for evaluating the concrete economic aspects associated with SHP development must be established;

(d) A low-cost simplified feasibility study procedure, such as a "fill in the blanks" manual, should be developed for SHP projects. This must take account of the limited data usually available in African countries, but must still meet the minimum needed for sound engineering practice and the basic requirements of lending institutions;

(e) In preparing reports and feasibility studies, maximum use should be made of modern techniques of data processing, including low-cost computer software which has already been developed and applied elsewhere. This will make it possible for such studies to be undertaken locally at low cost;

(f) As part of the development of national personnel capabilities of SHP in African countries, a series of training courses should be held on a continuing basis. Consideration should be given to the establishment of an African Regional Training and Research Centre for SHP;

(g) Until the Training Centre has been established, training courses should be held on an ad hoc basis in African countries with the appropriate facilities. Maximum use should be made of instructional materials and lecturers from other existing regional training centres on SHP, especially the Hangzhou Regional Centre, in China;

(h) In carrying out training, appropriate course curricula should be developed and based on the existing teaching material of the other regional organizations. The following sequence of training courses was recommended (conducted in English and French):

(i) General introductory course on all aspects of SHP - duration 4 to 6 weeks;

(ii) Feasibility study preparation and data acquisition;

(iii) Low-cost civil works related to SHP;

(iv) Electro-mechanical equipment for SHP;

(v) Operation and maintenance of SHP stations;

(vi) The management of small hydropower systems;

(vii) The application of low-cost modern technology, such as desk-top computers and microprocessors, in relation to SHP;

(i) A comprehensive information exchange system should be established on a regional level and a regional data base for SHP should be developed. In carrying out this activity, maximum use should be made of modern information handling techniques;

(j) Information on small hydropower should be obtained from within the African region and other regions. This information should be collected, evaluated, and disseminated to all interested African countries;

(k) The participants strongly endorsed the establishment of an African regional network for SHP;

(l) As a long-term objective of the proposed African regional network a regional advisory service on SHP should be established. In the interim, advisory services could be sought from developing countries in other regions through UNIDO and other agencies;

(m) All African countries should be encouraged to establish national focal points for SHP, which would form part of the proposed African regional network;

(n) UNIDO was asked to bring the report of the Expert Group Meeting to the attention of all African countries and all relevant regional and international organizations and donor countries and to obtain their support for the establishment of the network and its successful implementation.

Specific recommendations

(a) The participants agreed to initiate a general training course on SHP to be held in Ethiopia. The details of participation and financial arrangements would be arranged between Caribbean Community (CARICOM), China, EELPA, the Hangzhou Regional Centre and UNIDO;

(b) The participants also agreed on the provision of readily available information on SHP to all interested African countries. This activity would be carried out jointly by the participants from CARICOM, the Hangzhou Regional Centre, Sierra Leone and UNIDO.

Project No. 9: Establishment and strengthening of the training capacity and capability in the field of design and production of agricultural machinery and implements for Africa

Objectives

(a) To carry out a survey of the present situation with regard to agricultural machinery, industry, and relevant training needs in order to establish or strengthen the training capacity and capability in the field of design and engineering of agricultural machinery and implements in Cameroon, Sudan and the United Republic of Tanzania;

(b) Assessment and determination of the type and extent of equipment for training.

Recommendations

(a) The situation of the agricultural machinery industry in Africa was critical, but not hopeless, provided that urgent co-ordination efforts at the national and international level were made;

(b) Agricultural development should be a priority area in the national development policy. Establishment and support of local production of agricultural machinery and improved training and education should be decisive factors in such a policy;

(c) Substantial savings in human and other resources could be achieved through proper selection and standardization of equipment and specific raw materials to be used, adopted, or manufactured in developing countries;

(d) The conditions prevailing in Africa called for the adaptation of imported equipment; this was already being done for certain equipment. However, there was a need for vastly improved capacity for such adaptation;

(e) There was ample untapped scope for co-operation between Africa and the rest of the world, as well as among African countries themselves. Several direct forms of co-operation among African countries could be initiated rapidly without elaborate intergovernmental arrangements;

(f) International co-operation should be developed in order to contribute to the implementation of African agricultural mechanization programmes. The national and subregional programmes should enjoy the technical support of ECA, the Food and Agriculture Organization of the United Nations (FAO), OAU and UNIDO;

(g) The development of African capacity for the design and manufacture of agricultural and rural equipment should be strengthened as soon as possible.

Project No. 10: Feasibility study on the establishment of a pilot unit for manufacturing, erecting and putting into operation mobile low-cost silos known as "FLEXILOS", for the storage of agricultural products

Objectives

To prepare a full techno-economic study including the assessment of the economical structure of the country as regards agricultural products; improvement of agricultural products by storing them properly in the future; studying the existing situation of storage capacities and silos in the country; studying the various technical aspects of selecting the most suitable locations for the silos; and collecting information on rain, temperature, humidity, and soil conditions. Also to prepare technical information and detailed drawings for establishment of a pilot unit of eight silos, taking into consideration transportation, energy, and other relevant aspects. Finally, prepare a proposal indicating ways and means of financing the pilot unit for mobile silos, together with a draft project proposal.

Recommendation

Following the discussions held with government officials and the United Nations Development Programme (UNDP), it was strongly recommended to undertake a formulation of a project for the establishment of a pilot plant for the production of low-cost mobile silos known as "FLEXILOS".

Project No. 11: Mini hydropower projects in the Republic of Guinea

Objective

To develop the country's hydropower potential for the generation of energy by installation of mini hydropower stations, thereby developing rural electrification and industrialization in the country.

Recommendations

(a) The Government of Guinea should put every effort into seeking financial assistance for the development of its power sector and rural electrification by installing mini hydropower plants at sites at Keno and Mongoa;

(b) Financial assistance could be obtained from international organizations such as UNDP, UNIDO, or through bilateral aid, foreign banks, investors, manufacturing consortiums or international development finance institutions;

(c) With respect to bilateral technical co-operation, particular care and attention must be given to how the objectives and scope of the programme are defined, in order to avoid hidden forms of technology sales governed by commercial objectives;

(d) Discussions should be carried out with some of the leading electro-mechanical equipment manufacturing firms; many of them might be interested in delivering their goods on a credit, loan, or grant basis;

(e) Training of one or two staff in the supplier's factory should be a condition of purchase when purchasing electro-mechanical equipment and imported machineries from the developed countries;

(f) Foreign currency requirements should be reduced by means of non-conventional technologies, standardization, national production of small parts and equipment, the use of local materials, and the use of local personnel in construction work.

Specific recommendation

The Government should take immediate steps to locate suitable sources for immediately financing a micro hydropower project at the Mongoa site (50 kW unit, costing a maximum of $100,000) as a demonstration plant, and then installing a number of similar "compact-packaged" types of units at several places.

Project No. 12: Preparation of IDDA workshops on the industrial strategy for the Central African Republic and Zaire

Objective

To assist the Governments in the preparation of a national workshop on industrial strategy, especially in the preparation of a paper to be presented and discussed during the workshop.

Recommendations

(a) The seminar should define a new orientation for the industrial development of the Central African Republic, taking into account the prevailing conditions in the country, i.e. a landlocked country which lacks adequate equipment and information;

(b) The following points should be considered in order to improve industrial development:

- Lack of savings potentials;
- Reduce dependency on foreign financing of projects;
- Increase in demand;

(c) The agricultural sector should be the basic support for industrial development;

(d) The link between agriculture and the industries should be emphasized in order to reach self-sufficiency in food and self-sustained development as recommended by the Lagos Plan of Action and IDDA.

Project No. 13: Identification and preparation of technical assistance projects for the IDDA programme in Ethiopia

Objective

The immediate objective is to develop the planning capacity of the Ministry of Industry system, i.e. the Ministry's head office, industrial corporations, and factories, in order to be able to generate and manage the implementation of well-conceived plans, programmes and projects.

Recommendations

The following projects (in order of priority) were recommended:

Number	Project
ETH/86/001/A/ /37	Rehabilitation programmes
ETH/86/010/A/ /37	Identification of potential local mineral-based industries
ETH/86/002/A/ /37	Formulation and implementation of a national industrial master plan
ETH/86/003/A/ /37	Management of the industrial planning processes
ETH/86/004/A/ /37	Establishment of an industrial information service
ETH/86/006/A/ /37	Establishment of a national textile institute
ETH/86/007/A/ /37	Establishment of a service centre for the furniture and joinery industries
ETH/86/009/A/ /37	Wet-maize processing plant feasibility study
ETH/86/008/A/ /37	Automotive components feasibility study
ETH/86/005/A/ /37	Establishment of national quality control centres

Several of the above projects could be of interest to donor countries which might be willing to finance them under bilateral agreements as well as take the leadership in project implementation.

Project No. 14: Rehabilitation of existing enterprises, diagnosis and direct management assistance

Objective

To make a clear diagnosis of the production and productivity situation of the large- and medium-size industrial establishments; to draw up a comprehensive rehabilitation programme; to prepare the work of a technical unit which would be based on the National Investment Commission; and to harmonize this revitalization and rehabilitation programme within the guidelines of the forthcoming "structural adjustment loan".

Recommendations

Technical unit

(a) Assist Liberian management in introducing modern management techniques in their enterprises such as production programming and control, product costing, budgetary cost control, break-even analysis, sales analysis and forecasting, worker motivation, and the introduction of incentive schemes;

(b) Provide consultancy services to firms in need, and by use of the technique known as "action learning", give managers specific tasks or projects to undertake, with regular visits and on-the-spot consultancy, allowing them to learn by "doing" and by their own mistakes. Periodic monitoring by the consultant could prevent the latter from getting too costly;

(c) Provide courses and seminars on the above topics which have the greatest impact on Liberian management, and in particular, provide courses in entrepreneurship to help and encourage Liberians to set up their own businesses. Donor countries and agencies have already indicated their interest in contributing to such programmes, and a small input could have a large impact.

Project appraisal and evaluation

A number of projects in Liberia have not reached their expected goals, or worse still, have not survived their first few years of existence. The most common cause is inadequate pre-feasibility and feasibility studies.

UNIDO regularly organizes seminars on the preparation and evaluation of industrial projects to ensure that only viable projects are launched, while non-viable ones are recognized as such in the early stages and either abandoned or modified. The National Investment Commission (NIC) could acquire a computer with COMFAR software for project evaluation which might also be used for storing data on the companies being monitored.

Technical training

There is a shortage of qualified Liberian technicians for machine shops, maintenance, cold-room operations and maintenance, saw-milling, saw-doctoring etc.

The greatest impact on the future development of Liberian industry could be made by providing the necessary support to the Monrovia Vocational Training Institute or by arranging training schemes for technicians in the above fields.

Assistance to companies

A list of companies in need of assistance and capable of rehabilitation, together with the fields in which help is required is given below:

(a) Mensurado Oxygen and Acetylene Plant - Plant maintenance, management development, technician training;

(b) Parker Paints - Production control, management training, and assistance in the procurement and installation of a one gallon tin-filling machine;

(c) Modalco - Marketing, merchandising, cost control, and product costing;

(d) Liberia Glue Industries - Marketing, merchandising, cost control, and product costing;

(e) Liberia Polyvinyl Industries - Marketing and assistance in finding new outlets and new applications in agriculture and land reclamation;

(f) M.I.C. - Management training and budgetary cost control;

(g) LIFAICO - Training of mechanics for maintenance workshop and training of cold-room personnel;

(h) MEZRAU - Assistance in the procurement and installation of a new extruder;

(i) Liberia Steel Products Corporation - Planned maintenance and assistance in the procurement and installation of a hot-tar dipping plant if a permanent market could be guaranteed;

(j) Metalloplastica - Budgetary cost control, product costing, and marketing.

Timber industry

A good job of rehabilitation has been achieved at Greenville (Yona International), Bomiwood (Gopa Consultants), and the LWMC (Printz Development Enterprises). These forestry concessions and saw-mills were in a bad state when taken over by the present management, but are now earning badly needed foreign currency from the export of logs and the production of plywood and cut timber.

In order to obtain the utmost value from the exploitation of Liberian forests, one of the country's main resources, every effort should be made in repeating this exercise in the other neglected concessions, with emphasis on the production of timber and plywood rather than just logs. This will require technicians and specialists and is the field in which the greatest impact can be made in order to redress the situation.

The NIC intends to request through official channels the rehabilitation of several of the enterprises mentioned above.

Project No. 15: Diagnosis of industrial enterprises in difficult situations

Objective

To establish a comprehensive diagnosis for each of the eight factories concerned, finding the real causes for productivity losses, and for the under-utilization of capacities. To describe the urgent work to be carried out in a first rehabilitation phase, for which UNDP has already earmarked $80,000, starting with factories where production increase is more likely. To suggest further assistance for rehabilitation work with the aid of UNDP or the World Bank.

Recommendations

Finances

(a) To take action in solving the financial problems and in establishing a permanent fund to run the project;

(b) To investigate and evaluate the exact financial requirements.

Production

(a) Provide the enterprises with skilled personnel through appropriate training;

(b) Provide the enterprises with sufficient electric power for full production.

Marketing

Study the market carefully to meet the country's supply and demand situation.

Organization

Review and improve the management system in the organization, so that importance is given to meeting delivery schedules.

Follow-up

After the diagnostic phase, the Government requested a large-scale rehabilitation project and UNDP is now preparing to finance such a project in its country programme between 1987 and 1990. It will be an umbrella project, which is now under discussion. The project document preparatory assistance has already been prepared by UNIDO based on data submitted by the experts.

Annex I

MONITORING DOCUMENT

Assistance to African countries and organizations through the provision of short-term technical advisory services

Projects implemented/under implementaton

Work sheet No.	Title	Amount ($)	Substantive officer/ Section	Remarks
1	Dissemination of information on the development of a natural liquid rubber pilot plant	3 600	IO/CHEM	Completed
2	National Technology Days	26 200	IS/TEC	Completed
3	Establishment of a pilot investment foundry at ARCEDEM	475	IO/MET	Completed
5	Seminar on maintenance and post investment	1 727	PC/DEV	Completed
6	Establishment and strengthening of the training capacity and capability in the field of design and production of agricultural machinery and implements for Africa	20 000	IO/TENG	
7	Identification and preparation of technical assistance projects for the IDDA programme in Ethiopia	13 450	IO/PLAN	Completed
8	Workshop and demonstration of appropriate technologies and equipment for the metal-processing industries	41 820	IO/MET	Completed
9	Collection of information on fish processing and storage equipment	1 325	PC/DEV	Completed

continued

Work sheet No.	Title	Amount ($)	Substantive officer/ Section	Remarks
10	Rehabilitation of existing enterprises, diagnosis and direct management assistance	20 000	IO/FCTY	Completed
11	Advisory services to CEAO on the preparation of the terms of reference for a fertilizer study	2 500	IO/CHEM	Completed
12	Assistance à l'élaboration du Plan National pour le secteur industriel (1986-1990)	9 500	IO/PLAN	Completed
13	Technical advisory services seminar in Bangui (CAF), Brazzaville (PRC), Yaounde (CMR)	35 437	PC/DEV	Completed
14	Technical advisory services seminar in Freetown (SIL), Accra (GHA)	37 600	PC/DEV	Completed
15	Technical advisory services seminar in Lagos, Nigeria	29 985	PC/DEV	Completed
16	Technical advisory services seminar in Conakry (GUI) and Bissau (GBS)	42 000	PC/DEV	Completed
18	Expert Group Meeting for the establishment of an African regional network for small hydropower development	25 000	IS/TEC	Completed
20	Seminar on the prospects for the manufacture of telecommunications equipment in Africa	127 569	PC/DEV	Phase I - Seminar - completed Phase II - EGM under preparation

continued

ork sheet No.	Title	Amount ($)	Substantive officer/ Section	Remarks
21	Assistance in the finalization of preparatory arrangements for the regional seminar on the development of telecommunications industries in Africa	3 921	PC/DEV	Completed
22	Demonstration of technologies in the fields of construction and building materials particularly appropriate for the Sahelian zone and least developed countries	1 500	NC/NGO	Completed
24	Support to, and participation in, the round table on the application of technological research results to industrial production	16 700	IS/TEC	Completed
25	Technical Advisory Service in agro-industries, with emphasis on fish and meat processing	3 500	PC/DEV	Completed
26	Fourth All-Africa Trade Fair	20 520	IO/FEAS	Completed
28	Preparatory assistance in the formulation of a programme for the mobilization of financial resources for the development of specific priority industrial branches in Africa	13 200	IO/COOP	Completed
30	Diagnosis of industrial enterprises in d[illegible]cult situations	22 300	IO/FCTY	Completed
31	[illegible]tance à la préparation d'un atelier national [illegible]r la stratégie industrielle et la DDIA	8 500	IO/PLAN	Completed

continued

Work sheet No.	Title	Amount ($)	Substantive officer/ Section	Remarks
32	Establishment of a pilot demonstration plant for vaccine production	7 400	IO/CHEM	Completed
33	Feasibility study on the establishment of a pilot unit for manufacturing, erecting, and putting into operation mobile low-cost silos known as "FLEXILOS", for the storage of agricultural products	14 000	IO/CHEM	Completed
34	Expert in the electro-mechanical engineering of mini hydro plants	16 500	PC/DEV	Completed

Annex II

KEYNOTE ADDRESSES

TEXTS OF SPEECHES BY SENIOR OFFICIALS OF THE HOST COUNTRIES AND THE UNDP RESIDENT REPRESENTATIVES

The Honourable Minister of Science and Technology, the Federal Republic of Nigeria, who spoke at the closing of the Seminar on New Technologies, conducted in collaboration with UNIDO on their programme for the Industrial Development Decade for Africa

It is my great pleasure to address you at the end of the Seminar on New Technologies. I am particularly pleased with the level of participation which, I am told, was broad-based, comprising not only individuals from the public institutions, but also people from the organized private sector. This type of wide coverage was precisely what we had hoped for and I am happy to note that we achieved that objective to a large extent.

Although I did not personally attend any of your sessions, I have reports that indicate the very high quality of presentations that were made by the UNIDO consultants who treated various aspects of the seminar. You not only showed a good grasp of the subject matter which you treated, but you also brought a great deal of insight into the problems of the industrialization process in a developing country such as Nigeria. You aptly related the kind of technology you advocate to the level of technical knowledge and expertise existing in the country. By this, I understand that you have advocated for and support a process of industrialization which has as an integral part of that process the internal ability to maintain industrial plants and machinery. I can assure you that we in this Ministry share very much that view. Indeed, we go further in maintaining that another important aspect of the industrialization process is also the ability to adapt existing technologies, whether they be imported or indigenous, and to generate new ones. In all cases, they must be supported by the ability to adapt techniques, whether they be simple or complicated.

I have noted with keen interest some of the technologies which have been presented at this seminar over the course of the last seven days. In the area of the use of plastics in agriculture, my attention is drawn to the drip irrigation technology, which we are told has very many advantages over the normal surface irrigation method. Among the many advantages of this new technology are water conservation, increased yield, soil preservation, greater control on fertilizer application, and better land use. It was also interesting to note the use of plastics in the construction of storage facilities for farm produce. These technologies are all well within the reach of small-scale farmers.

In the area of rubber processing, this Ministry will seriously look into the promotion of thermoplastics rubber, given the emerging automotive industry, which is bound to expand in the years ahead. The technology of rubber processing using powdered rubber holds great potential in Nigeria, given especially the fact that it is well suited for small- to medium-scale operations. We intend to monitor with a great deal of interest the operation and performance of liquid rubber in the UNIDO pilot plant which has been established in Côte d'Ivoire.

Your presentations on composite building materials were very appropriate. As you know, the building industry in Nigeria has depended greatly on cement as a major input. This has brought with it many difficulties associated with satisfying demand, to the extent that even with about half a dozen cement plants scattered around the country, Nigeria still depends heavily on imports to meet the demands of the industry. Composite materials which will utilize clay will be a welcome change for the industry. It is the intention of my Ministry to seek UNIDO assistance in strengthening research activities in this area.

Your emphasis on the extensive use of co-operatives in the fishing industry is very much in line with the thinking in this country. As you rightly pointed out, the technology for fish storage is universal, what is needed now is to maximize productivity by encouraging fishermen to share facilities.

Ladies and gentlemen, although you did not specifically treat topics connected with the textile industry, my attention has been drawn to the textile pilot plants set up by UNIDO in China and India. The model which you have used in these plants has a great deal of appeal for a country such as ours in which the fortunes of the textile industry are dictated to a large extent by lack of innovation and inability to utilize locally available raw materials. It is my intention to explore the possibilities of establishing such a pilot plant in Nigeria in the near future.

Before I conclude this address, I would like to take this opportunity to express the gratitude of the Government to UNIDO for co-sponsoring the seminar. I do hope that we will always continue to count on your future co-operation and support in our efforts to bring about a faster pace of industrialization. In this connection, I hope UNIDO will give us the necessary support to allow us to develop the capabilities in Nigeria in the application of the technologies that have been discussed at the seminar. I should like to acknowledge the assistance which you have rendered in the past to other areas of the science and technology systems in this country. I should also like to thank the Office of the UNDP Resident Representative who is our contact point with UNIDO, and indeed with all the other United Nations specialized agencies. My thanks also go to the UNIDO consultants who have done a wonderful job at this seminar. I can assure you that we have listened very attentively to your expert advice. I am personally looking forward to receiving your final recommendations.

For those of you who are visiting Nigeria from other countries, I hope that you have had the opportunity to travel outside Lagos. I only wish you a safe journey back to your homes. Please come back again to share your further experiences with us.

The Minister of Trade and Industry, Republic of Sierra Leone,
who spoke at the Seminar/Demonstration on Selected Technologies,
held from 5 to 10 August 1985, at the Institute of
Public Administration and Management

I am indeed honoured to be invited to deliver the keynote address for this Seminar/Demonstration on Selected Technologies. As you are aware, UNIDO and UNDP, in co-operation with my Ministry, have organized this demonstration on five important, and, perhaps relevant technologies in the industrial

sector. The technologies selected for demonstration are production of fishing equipment, fish processing and storage; plastics in agriculture; polymerized clay; bentonite and perlite in agriculture; and the processing of natural rubber.

On behalf of His Excellency, the President, the Government, and people of this country, I would like to place on record our appreciation to the UNDP Resident Representative, the representative of UNIDO, and the consultants, for their support in making the running of this seminar/demonstration possible.

This seminar/demonstration is a part of the implementation programme of the Industrial Development Decade for Africa, launched by the General Assembly of the United Nations in December 1980. Its objectives are in conformity with the Lagos Plan of Action and are intended to increase the share of Africa's industrial production from 1 per cent of the world's industrial production in 1980, to 1.4 per cent in 1990. This goal is proposed to be achieved by the implementation of programmes to attain self-sufficiency in food, building materials, clothing, and energy so as to satisfy the basic needs of the African people.

The target set for the Industrial Development Decade for Africa is a challenge of great magnitude. It is estimated that during the Decade, Africa would need to invest $140,000 million in industry to reach the Decade's target. The most important issues that should concern most of us are how to galvanize such investments in the industrial sector and how to ensure that such investments are made effectively useful by developing our own receptive and absorptive capacity for such a massive investment.

Each African country has its own priorities in respect to industries, but all have one thing in common. That is, the ever-increasing need to develop agricultural and agro-based industries. I am glad to observe that three of the five technologies selected for demonstration are related to agriculture.

The Government of Sierra Leone has recognized that agriculture and industry are the two main pillars to sustain our economy in the future and to end the present crisis of food shortages and high prices.

In Sierra Leone there has been a long tradition of trade in minerals, agricultural produce, and imported consumer goods. As long as the prices of minerals and agricultural produce were favourable there was adequate foreign exchange and liberal imports of consumer goods. In such a situation, the traders were making good profits. There was, therefore, no incentive to produce goods locally. Now that the sources of foreign exchange are becoming less and the inflow of consumer goods is proportionately decreasing, the traders do not have an alternative local supply base. The decrease in the volume of trade and the consequent shortage of consumer and other goods has brought into sharp focus the importance of strengthening the domestic production base.

My Ministry has taken up the challenge to rectify this situation by laying emphasis on industrial development. In 1983, the Development of Industries Act was passed into law. This Act is a comprehensive piece of legislation setting out the national priorities for industrial development, outlining the incentives and facilities for foreign and local investors and stipulating guarantees for investors. The Act is being implemented by the Industrial Development Department which has just been established in my Ministry. The different aspects of industrial development are carried out by the Industrial Planning, Industrial Operations, and Small Industries Divisions

of this Department. We had continuing professional support in these activities from the United Nations Development Programme in initiating and implementing these activities.

Industrial development in Sierra Leone started on a very small base. In 1981, industries contributed less than 5 per cent to the country's national economy. This demonstrates that our country has one of the smallest industrial bases in Africa. Among the larger industries are those that cater for the consumer demands utilizing foreign technologies and imported raw materials.

The small-scale and handicrafts industries accounting for 60 per cent of the national income in the industrial sector and providing employment to 90 per cent of the people in industries, mostly use local raw materials and provide the basic needs of the local people. These industries are traditionally rice processing, garri making, fish smoking, weaving, carpentry, blacksmiths for agricultural hand tools, brick making, palm oil extraction etc.

In contrast to the medium and large industries the small industries are owned and operated by our own nationals. They have survived many ups and downs in their fortunes and have proved their staying power. These entrepreneurs, spread all over the country are the seed-bed for future industrial development of this country.

When we talk about appropriate technology these small entrepreneurs should be given top priority. I would urge the participants of this technology demonstration seminar to consider how best we can transfer the benefits of technology to the remotest corners of our country where a garri maker, by introducing improved technology, can provide better quality and increased quantities of garri; the palm oil extractor can increase the recovery and quality of oil, and the blacksmith can produce not only better quality tools but also assist the farmer in reducing his fatigue and increasing his productivity. Any assistance given to the small producer brings immediate and direct results. A dollar spent in this direction would be more beneficial than one spent on grandiose and high-sounding institutions and research programmes which we in poorer countries establish for prestige and leave to decay as monuments.

The two important and critical aspects of technology application in poorer countries are the establishment of a technology delivery system and the development of a capability to absorb and adapt technology.

All of us are aware that a large number of technological research and development institutions abound in the industrialized and some third world countries. Varieties of technologies have been developed and successfully applied in different industrial fields, involving huge dollar expenditures. The question we have to ask ourselves in Sierra Leone is whether we should go in for prestige projects of basic research and spend our resources on the well-trodden path, or alternatively, use our scarce resources to develop systems or mechanisms to deliver successfully demonstrated and proven technologies to areas and sectors where they can be applied locally.

Japan made remarkable strides in industrialization after the Second World War, not by embarking on basic research in technology, but by developing a capability to absorb, apply, and adapt technologies developed by others and by establishing an efficient and effective technology acquisition and delivery system. We in Sierra Leone have a lot to learn from their experience.

My Ministry of Trade and Industry, as I said earlier, has taken up the challenge of industrialization and technology application quite seriously. The Ministry has prepared a development programme for five years and is currently giving assistance for the implementation of the programme to the private sector. Furthermore, a number of feasibility studies and project profiles are available in the Ministry. In fact, through the assistance of UNIDO, the Ministry has given assistance to several small-scale entrepreneurs to establish soap-making, metal-work, carpentry, and tailoring industries. In some cases, existing technologies have been improved and in others new and improved technologies have been experimented upon and introduced.

In addition, my Ministry has prepared an innovative Growth Centre Programme to assist small and rural industries. It is a grass-roots direct assistance programme to small industries within their own environment. This programme envisages full participation of the rural community in planning and execution of small industry projects with the Government playing only a catalytic role of providing technical and extension services. Growth Centres are now in progess at Kpandebu in the Kenema District, Masongbo in the Bombali District, Dandabu in the Pujehun District, and at Tower Hill in the Western Area with the initial assistance of UNDP. It is expected that further assistance in this area will be forthcoming from the European Economic Community (EEC).

According to plans in my Ministry, such Growth Centres will be used as delivery mechanisms for transferring technology to the rural areas. Experiments have already been completed to transfer improved soap-making and weaving technologies to the rural areas through the production-cum-training facilities at the Growth Centres. Those of you who would like to see how this mechanism works are invited to visit the Western Area Growth Centre at Tower Hill.

At this juncture, I wish to state that it has been recognized that one of the major constraints for the implementation of small- and medium-scale industries in this country is the absence of an institution for the procurement of raw material equipment and the provision of marketing facilities. Presently, with the assistance of the World Bank, a feasibility study on the establishment of a non-governmental organization to provide these services is being conducted.

The subject of industrial development is intimately connected with the application of technology and the development of technological capability which is a human resource aspect of development. My Ministry is extremely happy to host this demonstration and seminar jointly with UNIDO, and I wish the participants success in their deliberations.

Finally, I wish to assure all of you here present that my Ministry will render all possible assistance to implement any meaningful proposal that may be put forward to absorb, adopt, and apply any aspects of the technologies that will be demonstrated here.

UNDP Resident Representative, who spoke at the closing ceremony of the Tas Seminar, Lagos, Federal Republic of Nigeria, on 23 September 1985

I am happy to be here again at the successful completion of your seminar and demonstration sessions. I have followed your deliberations from my office and I understand your discussions have provided a good forum for exchange of views between the Nigerian participants and UNIDO experts on the technologies

presented. The credit for organizing and conducting the seminar in such an effective way should of course go to the Ministry of Science and Technology. UNIDO is very happy to have had this opportunity because the basis for future co-operation has been formed.

UNIDO will study your recommendations with great interest and will be ready to provide technical assistance in all aspects of industrial development focusing on technological innovation. I understand that great interest has been shown in the promotion of the use of plastics in agriculture and in the composite materials, especially of polymerized clays for the production of building materials. The rubber processing industry seems to have great potential for development as Nigeria imports large quantities of rubber products.

Fish processing and manufacture of fishing equipment is also an important sector as large quantities of fish are produced by the artisanal fisherman who would benefit greatly by fish processing as well as by the production of their basic requirements such as fish nets. In order to ensure UNIDO involvement in these interesting areas, Nigerian counterparts have to be identified as early as possible, and project ideas have to be formulated in accordance with national plan priorities. The earlier these project ideas are formulated the better because there are always many competing demands on limited funds. UNIDO and my office in Lagos will be happy to be of assistance in the design and preparation of such project proposals.

I have no doubts that the enthusiasm and the awareness generated at this seminar will be channelled to the maximum advantage of the Nigerian economy. Let me also mention that UNIDO experience in the field of petro-chemical development is quite extensive and is available to Nigeria if she so wishes. The sector of petroleum refining, fertilizer, and pesticides is a specific area where UNIDO staff can provide immediate assistance to Nigeria.

I would like to thank the Ministry of Science and Technology and the Nigerian Institute for Oceanography and Marine Research for their untiring efforts throughout the seminar and, prior to that in making all the arrangements. The participants in the various sessions of the seminar merit special thanks for their keen interest and informative approach. UNIDO experts who have taken pains to understand the Nigerian industrial reality and prepared appropriate materials deserve our special appreciation.

Finally, I would like to express my firm hope that the Lagos Plan of Action which expresses our highest hopes and the IDDA will be effectively implemented in Nigeria because this country, more than any other in sub-Sahara Africa, has the potential for industrial take-off.

Mr. Da Graca, UNDP Resident Representative, who spoke at the opening session of the Seminar on Technical Advisory Services, at Bissau, Republic of Guinea-Bissau, on 23 September 1985

I would like to thank Mr. Furtado, Director, General Directorate of Industry, for presiding at the opening session of this seminar about new technologies, organized in co-operation with UNIDO. Your presence, Mr. Furtado, proves once more the interest attributed by the Government of Guinea-Bissau to the activities undertaken by the United Nations system.

The various demonstrations to be undertaken during this seminar fall within the framework of the Industrial Development Decade for Africa, decided at the Third General Conference of UNIDO, at New Delhi. This decision was

ultimately confirmed by the Organization of African Unity in the so-called Lagos Plan of Action, and finally by the General Assembly of the United Nations, which proclaimed the period from 1980 to 1990 as the Industrial Development Decade for Africa.

The importance of IDDA activities cannot be doubted because the African part in world industrial production is minimal, and every effort must be made in order to increase it. If it is true that agriculture is the base of the economy, Guinea-Bissau's industry is an indispensable complement to the acceleration of development through the impact it has on the increase in productivity in the agricultural sector. Besides dissemination and promotion of new technologies, the actual UNIDO project includes a diagnosis of industrial plants in difficulty, bearing in mind their rehabilitation and in addition, assistance in the preparation of an industrial development plan. These are activities which will be beneficial to Guinea-Bissau, provided the Government considers them relevant. For these promotional activities towards industrial development, a global allocation of $5 million was made to be utilized in different countries, according to necessity. The experts of UNIDO will deal in Bissau with subjects related to:

- Fish and meat conservation and processing.
- New construction materials.
- Mini hydropower plants.
- Biomass for energy generation.

Even though the duration of this seminar is rather short, only two days, we hope that the participants will be able to benefit from the ideas and suggestions which will be made by the various experts.

This seminar is only one of the activities foreseen and we hope that in the near future other activities of broader scope can be launched which will contribute to the industrial development of Guinea-Bissau.

Mr. Furtado, Director, General Directorate of Industry, Ministry of Natural Resources and Industry, who spoke at the opening session of the Seminar on Technical Advisory Services, at Bissau, Republic of Guinea-Bissau, on 23 September 1985

I welcome with pleasure and satisfaction the experts of UNIDO as well as all who are present here attending this seminar. I am equally grateful to the UNDP Resident Representative of Bissau and to UNIDO for having selected Guinea-Bissau for the implementation of such an important event in the field of professional training.

The realization of the seminar under the auspices of UNIDO is being undertaken following the interest shown by both Guinea-Bissau and UNIDO, in developing and reinforcing the existing ties of co-operation in the spirit of the Industrial Development Decade for Africa.

It goes without saying that in the field of development, success is not possible without giving priority to human resources. High technology and capital investment do not serve for anything without the inventiveness, the competence, and the work of the national cadres. The competence of the national cadre is an essential element in national development, and can play a key role in many cases. Any country which is unable to utilize its trained staff at all levels and in all sectors of its administration, is in various ways unable to make the best use of and explore all its resources, be they natural, industrial, or agricultural.

The lack of qualified personnel means that an industrialization programme does not yield significant results. It is in this context that this seminar deals with the training of technical cadres in the important areas being covered. We all know the importance of energy, food, and construction materials in the socio-economic development of a country, and in this context I am fully convinced that the participants will benefit from the demonstrations which will be valuable for their professional work.

Finally, I wish to thank once again everyone who has come here despite busy schedule, thus demonstrating your strong interest for personal training in the first place, and for the subjects covered, thus contributing at the same time to the importance that this event merits.

Dr. M. P. Mhiwatiwa,
Deputy Minister of Information, Posts and Telecommunications,
Republic of Zimbabwe, who spoke at the UNIDO/PATU Seminar on the
Prospects for the Manufacture of Telecommunications Equipment in Africa

I would like to welcome you on behalf of the Government of the Republic of Zimbabwe. I would also like to express my appreciation to the organizers, UNIDO and the Pan African Telecommunications Union for choosing Zimbabwe as the location of the seminar, which is being undertaken as one of the UNIDO activities for the Industrial Development Decade for Africa. I see this as a major step in promoting the endeavours of the African states in their objectives of improving the communications network within the continent.

This seminar will discuss important issues pertaining to the development of local manufacture of telecommunications equipment in Africa. This target is in line with the objectives of the Organization of African Unity and African development objectives as enunciated in the Lagos Plan of Action.

The importance of telecommunications to national economic development has been discussed at length in many national and international conferences. The issue has always ended with the question of the chicken and the egg. In other words, the question of putting communications as a priority has always been forged with national competing needs.

In spite of the difficulties, many African governments are now putting a great deal of emphasis on communications as illustrated in the development of the Pan African Telecommunications Network (PANAFTEL).

Our experience since independence has proved the symbiotic interdependence between an efficient telecommunications network and the successful implementation of national development programmes, whether they be in industry, commerce, agriculture, mining, or the social and public sectors.

We have also encountered numerous constraints in the areas of network rehabilitation, maintenance, expansion, and integration. Coupled with this are the constantly nagging problems related to the lack of spare parts, replacement of old and obsolete plant and equipment, and shortage of skilled staff.

In addition, total technological dependence on the developed world is becoming a problem which comes close to threatening the efficiency of telecommunications in Africa. The fact that nearly all telecommunications equipment is imported with little or no local inputs should no longer be acceptable. The amount of foreign currency involved is prohibitive. We have

encountered problems of managing an assortment of equipment from different manufacturers. We have faced problems of training, at great expense, our engineers and technicians to service a never-ending range of different equipment engendered by the rapid technological changes in the developed countries.

Furthermore, within the African countries, and our PTA and SADCC region in particular, there exists a disparity between urban and rural areas in the quantity and quality of services available. The backward telecommunications services in the remote rural areas are often compounded with the general absence of developmental infrastructure such as transport, manufacturing and commercial centres, health facilities, and other social amenities.

What can Africa do to rectify the situation? Unfortunately, solutions are not always available and are even more difficult to provide at a national level. In my opinion, the solutions can be found in sub-regional and regional co-operation. The pre-conditions for the successful launching of a telecommunications manufacturing industry dictate that such a venture cannot be viable at a national level because of the size of the capital outlay required, the limited market, diseconomies of scale, and the need for setting internationally acceptable standards. We, in Zimbabwe, are committed to this regional co-operation in the following areas: procurement policy, which entails the standardization of personnel development, and research into import substitution.

In this important venture our efforts would not be effective without the transfer of appropriate technology from the developed countries. We should call upon the developed world to join us as partners in what will be the most exciting socio-economic transformation in the third world. The backwardness of Africa's communication systems poses the greatest challenge to the world. It will be impossible for developing countries to do meaningful business within the continent. Therefore, our local efforts deserve international support. We, therefore, seek international support from the developed countries whose technology will play a key role in the success of this ambitious programme. Both worlds will benefit.

It is my belief that the conclusions and recommendations of the seminar will greatly benefit the African telecommunications industry as they will call for action to establish the conditions for its development. Also, I have great hopes that your readiness to exchange experience will promote closer co-operation between our countries and that at the end of this week, you will have identified important projects, especially those which could enhance technical co-operation among developing countries. Furthermore, the fact that some manufacturers and suppliers of technology are also participating in this seminar, has great merit; their contributions will be a positive input to your deliberations.

Mr. Assane Diallo,
Representative of the Secretary-General of the Pan African Telecommunications Union (PATU), who spoke at the UNIDO/PATU Regional Seminar on the Prospects for the Manufacture of Telecommunications Equipment in Africa, Harare, Zimbabwe, 6 to 11 January 1986

May I first convey to you the apologies which Mr. Mamadou Bobo Camara, the Secretary-General of the Pan African Telecommunications Union, asked me to offer you for his not being here today at the opening meeting. He had long planned to attend in person but compelling reasons forced him to remain at headquarters at Kinshasa.

As most of you know, preparations are under way for the third session of the PATU Conference of Plenipotentiaries which is to be held at Arusha, United Republic of Tanzania, from 20 January to 7 February 1986. This is only a matter of days away. The work these preparations involve often imposes restrictions on the chief executive of the Union, from which he cannot escape, and this is the case here.

He has, however, asked me to assure you of his special interest in this seminar and in the subjects under discussion.

Mr. Camara is most grateful to His Excellency the Minister of Information, Posts and Telecommunications for the concern he has shown and, through him to all the fighting people of Zimbabwe. Once again, the people of this country are showing and providing their militant adherence to the cause of liberation on all fronts and their commitment to African unity, under the guidance of their respected leader, Mr. Robert Mugabe. Zimbabwe remains the symbol of African liberation.

We at PATU have been very interested in seeking Zimbabwe's collaboration in the activities undertaken by UNIDO and our organization, and we were most pleased that the Government of Zimbabwe accepted the proposal to host the seminar in Harare, one of the most beautiful cities in Africa. This also gives us an opportunity to benefit from the notable experience of this country in the field of industrial development in general and in telecommunications in particular.

The subject of this seminar represents an entire programme of action. Indeed, if we look at how far behind we are - if one can speak in this way - in the manufacture of telecommunications equipment, it can be said that Africa still has a very long way to go and much work to do. This is true. But we are sure and confident that in this particular battle for self-sufficiency, we can succeed.

Our conviction is strengthened by a need that we all have, just as other countries and regions of the world had in the past, the need to develop a suitable research and development and manufacturing capacity in order to undertake and, more especially, to maintain the regular changes in our telecommunications networks. Especially in this age of rapid technological change, Africa cannot be the exception to what seems a universal rule: no country has ever succeeded in properly developing its telecommunications systems without having first established its own means for the manufacture of equipment.

We are confident also because we have with us a young and dynamic United Nations specialized agency through which the international community lends its support and assistance to our regional efforts. This agency is, of course, the United Nations Industrial Development Organization, with which PATU has now been co-operating fruitfully for five years. We are sure that this co-operation will continue and become more intense in the future, particularly within the framework of the programme of action that will emerge from this seminar.

In the course of the week we are going to try together to explore more thoroughly the ideas and issues raised at the first regional seminar on industry that was held at Algiers, in November 1982, again as a result of collaboration between UNIDO and PATU, with the assistance of the Government of Algeria.

That first meeting laid the groundwork for the subject and suggested possibilities of co-operation on the part of other countries and regions of the world from which Africa might benefit in order to develop its own telecommunications industry. The participants also had the opportunity of having an initial view of the experience of a number of countries, in both the North and the South.

Among these experiences, we "discovered" that a large developing country, India, had been able, through means available to us, to take up the great challenge of industrial development in the area of particular concern to us. Since then, we have had the opportunity to go and study at first hand the methods used, finding cause to be more firmly convinced that Africa (which abounds in the necessary materials) can change the situation. This conviction is all the stronger because our traditional partners are also showing an encouraging willingness to assist us. The ball is in our court.

Once again, we express our gratitude to the Government of Zimbabwe for having enabled this meeting to take place and for the brotherly welcome given to all participants. As far as PATU is concerned, this is further evidence of this State's commitment to our organization and its very practical contribution to its activities.

We are also grateful to the participants and observers for agreeing to take part, despite its being held so soon after the holiday and to share with us their rich and often exciting experience. This is a practical exercise in the transfer of know-how that is up to us to develop in the future, in the context of co-operation that all partners find fruitful and rewarding.

Mr. A. Ambatchew, Resident Co-ordinator, United Nations system's operational activities in Zimbabwe

It gives me great pleasure to welcome you to the seminar on the prospects for the manufacture of telecommunications equipment in Africa, which has been organized by UNIDO in co-operation with the Pan African Telecommunications Union. On behalf of the organizers I would like to express our gratitude to the Government of Zimbabwe for agreeing to host this important seminar. In particular, the efforts of your Ministry and the Zimbabwe Post and Telecommunications Corporation have been invaluable to the successful organization of this meeting. This effort is evidenced by your presence, Mr. Minister, at this opening ceremony, despite your heavy commitments.

The seminar is part of the activities for the Industrial Development Decade for Africa, a special programme for the period 1980 to 1990, which was initiated by the Heads of States and Governments of African countries through the Lagos Plan of Action. The programme was adopted by the General Assembly of the United Nations at its thirty-fifth session, in its resolution 35/66B, which reinforced the decision of the Lagos economic summit. The effective implementation of this programme of action depends on industry acting as a supplier of essential inputs to the economy and becoming an efficient user of the outputs of other sectors.

In pursuance of the mandate from the General Assembly, UNIDO is co-ordinating the implementation of the IDDA in the framework of the Lagos Plan of Action and in accordance with the development priorities set out by African governments. The emphasis has been placed on the promotion of technologies and industrial sectors which have a bearing on the critical needs of Africa.

Under the IDDA programme, UNIDO has undertaken a specific project of Technical Advisory Services to African countries. This project is expected to promote the application of basic industrial technologies through seminars and demonstrations in the priority sectors identified by African governments. The seminars have thus far covered industrial sectors related to agricultural inputs, food processing, low-cost housing, and energy.

This regional seminar is focused on the telecommunications sector which is of central importance to Africa. The vital role of this sector in the economic consolidation at national, regional, and international levels is obvious. The manufacture of telecommunications equipment also offers opportunities to master a wide range of industrial processes and technologies. The programme of this seminar has been designed with the intention of raising issues which are central to the manufacture of telecommunications equipment. I hope that the deliberations during the course of this week will enable you to review the problems confronting African countries; to analyse technological options; and to formulate precise project areas in which assistance could be provided at the national, sub-regional, and regional levels to realize the objectives of African countries.

In recognizing the importance of telecommunications to Africa, several organizations have been engaged in assisting African countries at national and regional levels in this field. Apart from the efforts of ITU in this area, a regional seminar was held by PATU and UNIDO in November 1982, at Algiers, on the promotion and development of telecommunications industries in Africa. That seminar arrived at specific recommendations on actions to be taken for the development of this industry. In addition, I would mention the importance of telecommunications in the UNDP country technical co-operation programme for Zimbabwe. With UNDP funding and ITU execution, a draft telecommunications master plan is being finalized for submission to the Government. Future support to this sector will be formulated within the framework of this master plan. Support has already been provided for installation and testing of telecommunications equipment throughout the country. Through a special contribution from the Government of Switzerland, the United Nations system is also involved in training telecommunications staff. Keeping these efforts in mind, I would hope that your deliberations on the subjects raised here would be complementary to the technical assistance already provided and the facilities already in place in the African continent. In particular, the development of human resources for this sector would be a topic of major concern.

In concluding this introduction, I hope your deliberations this week will yield action-oriented project formulations which could be realized through the technical co-operation programme of the United Nations system.

UNDP Resident Co-ordinator, who spoke at the closing session of the Seminar on New Technologies

Mr. Minister,

It is not inappropriate, Sir, at the closure of this seminar for the presentation and demonstration of new technologies, organized by your Department in collaboration with UNIDO, to say how much we appreciate your interest in the subjects which have been presented. We wish again to express our gratitude for the active presence of both yourself and those accompanying you.

We have now come to the end of three very instructive days. Our experts from UNIDO have endeavoured, as we asked them to do, to present to management staff of the Central African Republic technologies which are still little known in developing countries. Composite materials which are simple and flexible in application should help in the effort to find a minimum-cost but durable solution to the burning questions of housing and community facilities. They can assist in solving problems of storage of food products which are lacking in the unfortunately ever-increasing number of countries and regions faced with dramatic problems of drought, famine, and other natural calamities.

With regard to "plasticulture", which is becoming increasingly important in several industrialized countries, this may often lead to an increase in agricultural production.

Irrigation techniques may be a solution in regions where water problems are acute. The use of bentonite and perlite for water retention is undoubtedly a possibility to be studied.

In addition to these new subjects which have been introduced, information has been provided on building materials. When it is known that the African continent spends about $2.5 billion every year on imported building materials, whereas it is quite possible to achieve collective self-sufficiency in this sector, there should be no hesitation in exploiting the significant potential of so-called local materials.

I believe that the message has been understood, for the participants have made a point throughout of assiduously attending the presentations, the demonstrations, and above all the discussions, which have been led in a masterly fashion.

The discussions, or more exactly the exchanges of views, have been beneficial to everyone. Our colleagues have learned a great deal during these three days and will certainly profit from the very pertinent remarks made by the specialists from the Central African Republic who are confronting the country's real problems.

The conclusions which have been drawn from this meeting will be carefully examined both by UNIDO and by other agencies in the United Nations system.

I can assure you now that even more than in the past our assistance, in so far as means are available, will not be lacking.

I cannot conclude without congratulating all the distinguished persons who have participated in this seminar.

Allow me to draw attention to the fact that Directors; Heads of Services; senior officials of the Ministries of Industry, Equipment, Agriculture, and Rural Development; the University; State corporations; and private enterprises, private entrepreneurs, managers of small industrial units and workshops, architects; and the Association of Enterprises (with my apologies for not giving a complete list) have not hesitated to leave their daily occupations to come here and participate in these sessions, which they have made a point of following from beginning to end.

This confirms, for us, their genuine interest in the subjects that have been presented. May they rest assured that our relations will not be limited to these few days but will lead to concrete results so that, at the end of the Industrial Development Decade for Africa, the Central African Republic and othe States in the continent may show a positive balance.

Congo

Allow me first to thank you, Mr. Cabinet Director, despite your many concerns and the short notice you were given, for coming to preside personally over the opening ceremony of the Seminar for the Demonstration of New Technologies organized with the collaboration of UNIDO.

Your presence on this occasion bears witness to the interest of the Government of the Congo in developing co-operation with the United Nations system.

The series of demonstrations and presentation sessions planned for this week come within the framework of the Industrial Development Decade for Africa. You will no doubt recall that it was at the Third General Conference of UNIDO, held at New Delhi in 1979, in which your Government played an effective role, that it was proposed to make the decade 1980 to 1990 the Industrial Development Decade for Africa.

At the Economic Conference of OAU where the important declaration known as the Lagos Plan of Action and Final Act were adopted, the Heads of State of OAU, aware of the importance of industrialization in the economic development of African States, decided to focus particular attention on the industrial sector.

The General Assembly of the United Nations then proclaimed the current decade the Industrial Development Decade for Africa. In the course of this decade, every effort must be made and every means deployed to significantly increase Africa's share in world industrial production.

The first phase of this decade ended in 1984. This phase was to allow the sensitization of all national, regional, and international institutions to the problems and potential of industrial development in Africa.

During this period important meetings were organized in which the People's Republic of the Congo spared no effort to participate actively and effectively.

I would like to take advantage of this occasion to recall that it was in March 1984, at Addis Ababa, that the Conference of African Ministers of Industry approved the work of the different subregions of Africa. Having examined the implementation of the initial programme of the Industrial Development Decade for Africa, the Ministers of Industry decided to ask the General Assembly of the United Nations to place at the disposal of UNIDO the means for the implementation phase currently in progress. The Fourth General Conference of UNIDO, held at Vienna, in August 1984, also reaffirmed the necessity of supporting the programme of the decade. For the year 1985, a budget of $5 million was allocated.

On the recommendations of the General Assembly of the United Nations, UNIDO initiated a certain number of activities and projects, including this "technical advisory services" project. This new project has three facets:

- The presentation and dissemination of new technologies.

- The diagnostic appraisal of industrial units in difficulties with a view to action for their rehabilitaton and promotion.

- Assistance in the formulation of an industrial programme within the development plan in certain African countries.

UNIDO is endeavouring with this project to respond, in a modest way, to the needs expressed by the Ministers of Industry.

A certain number of countries, one of which was the People's Republic of the Congo, were selected to receive assistance under this project. Thus this UNIDO mission is visiting three countries in the subregion in a first phase, namely the Central African Republic, the People's Republic of the Congo and the Republic of Cameroon.

The following themes will be discussed during the three days: composite materials and building materials; and the production and application of plastics in agriculture.

UNIDO has called on two highly qualified consultants to lead this seminar:

- Mr. Robert Brun, general agricultural engineer, Director of the Research Station, Chairman of the French National Committee for Plastics in Agriculture.

- Mr. Etienne Verheugen, architect, expert in composite materials.

I am sure they will acquit themselves with honour in their tasks.

I would also like to bring the presence of other members of the UNIDO team to your attention:

- Mr. Ibrahima Djibo, a staff member from UNIDO headquarters, project co-ordinator, in the Division of Policy Co-ordination.

- Miss Sylvia Gfundner, UNIDO Secretariat.

The list of participants in this seminar already contains the promise that, after the presentations and demonstrations by the UNIDO experts, fruitful discussions will lead to concrete results which can be used in drawing up a programme for the sectors concerned.

Before concluding I would like to stress that, despite the limited time available, your staff made remarkable efforts to ensure that this seminar could begin on the planned date. They are to be congratulated.

I should like also to thank all the distinguished persons who accepted our invitation, despite their other commitments, and also all the participants from administrations and public and private enterprises; I am convinced that they will derive benefit from this seminar.