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

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INDUSTRIAL DEVELOPMENT PROMOTION AND PLANNING

DP/SIL/83/001

SIERRA LEONE

Technical report: Activities, impressions and recommendations of the industrial engineer*

Prepared for the Government of Sierra Leone
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

Based on the work of M. Raza Ali,
industrial engineer

United Nations Industrial Development Organization
Vienna

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Explanatory Notes

A currency exchange rate of US$ 1.00 = Le 5.00 (local currency) and all costs, rates and prices used are as of 25 June 1986.

Abbreviations

UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization
MTI	Ministry of Trade and Industry
SIDFA	Senior Industrial Development Field Adviser
IDD	Industrial Development Department
CFTC	Commonwealth Fund for Technical Co-operation
EEC	European Economic Community
LPG	Liquified Petroleum Gas
FFB	Fresh Fruit Bunches
FF	Fresh Fruit

Abstract

The assignment of an industrial engineer was one of the most important inputs to the project DP/SIL/80/007 - Planning and Promotion of Industrial Development, and DP/SIL/83/001 - Industrial Development Promotion and Planning.

The recruited expert, Mr. M. Raza Ali, has served in the above projects as an industrial engineer from September 1982 to December 1984. Mr. Ali was re-called in April 1985 on return-mission to Sierra Leone for the final phase of project DP/SIL/83/001 until June 1986.

The end-of-assignment report lists the different activities of the expert during April 1985-June 1986. Direct assistance to the Ministry of Trade and Industry in implementation planning of the Growth Centres Programme for development and promotion of small-scale industries as well as the problems of appropriate technology development have been the main subjects of his assignment. The support to UN, CFTC and World Bank consultants on mission in Sierra Leone and in-service training of counterparts have been further activities, described briefly in this report.

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INTRODUCTION

The UNDP/UNIDO Project DP/SIL/83/001 - Industrial Development Promotion and Planning in the Ministry of Trade and Industry had two Phases. The Preparatory Phase starting from July 1983 and ending in December 1984, was meant to bring to conclusion, the objectives initiated in the earlier Project DP/SIL/80/007 and to achieve in full its objectives - helping the Ministry in building up the Industrial Development Department into a functional institution capable of purposeful industrial planning, regional development through promotion of small-scale industries, and recovery planning and assistance for rehabilitation of existing industrial units.

The Final Phase (January 1985-June 1986) of the Project was aimed at consolidating the Ministry's structure for industrial development planning, industrial operations and small-scale industry development.

The expert also served in the Final Phase of the Project in the capacity of industrial engineer between April 1985 and June 1986.

This document reflects briefly the contribution of the industrial engineer as a member of a task force of UNIDO experts in achieving some of the objectives, his impressions and recommendations for consideration of all concerned.

RECOMMENDATIONS

1. Economic Problems:

Two of the most intractable problems facing the national economy are skewness in the distribution of income and precariousness of the unemployment situation. Both these problems are of a long-term nature, being the culmination of underlying trends in the economy, and indications are that unless corrective measures are taken urgently they are bound to worsen. Incomes are heavily skewed in favour of a small group of formal sector entrepreneurs, and the concentration of income has increased to such an extent that less than 6% of the population takes away more than a third of the national income. As far as the emergence of open unemployment the factors responsible are well known - urban-rural gap in incomes and social amenities, the migration of young people from rural areas, and the inability of the small modern-sector to absorb the new arrivals. It is estimated that over 21,000 persons are entering the labour market every year in addition to those who are already unemployed.

2. Possible Solutions:

2.1. There are no instant solutions to these problems, but solutions are available to master them gradually. These solutions could help improve the income inequality and prospects for employment in all sectors - agriculture as well as non-agricultural. But since the agricultural sector and the small-scale sector have to absorb the bulk of the growing population for many years to come, the solution to the unemployment and inequality problems has to be found mostly in the development of the agricultural and small-scale sectors.

2.2. The concern for income inequality and unemployment warrants adaptation of Basic Needs Strategy as a solution of these problems. A basic needs strategy argues that the poorer groups in the society should be made the focus of development and that steps should be taken to meet their basic needs.

Since a great part of the poverty problem is income inequality, many of the measures needed to satisfy basic needs are precisely those needed to correct trends towards inequality. And since the bulk of the poor are in the agriculture and small-scale sectors the required measures are those needed to develop these sectors.

2.3. Manufacturing Sector:

2.3.1 As far as the manufacturing sector is concerned its importance from the point of view of basic needs strategy lies in its potential to supply goods of mass consumption at reasonable price and to provide employment. But unfortunately in Sierra Leone the formal manufacturing sector in general is catering the needs of the small expatriate community and the elite, it is heavily dependent on imported inputs (the value of inputs in this sector is as high as 80% of the gross output when imported energy input is also accounted for), and it being capital intensive technology oriented is unable to achieve economies of scale in Sierra Leone's small market. With the result that its contribution to value added averages less than 30% as against 55% value added by the small-scale sector its share in GDP is less than 2% while that of the small-scale sector is nearly 3%, it employs less than 8,000 persons against 90,000 employed by the small-scale sector. Putting in a nut-shell the formal manufacturing sector in Sierra Leone has proved to be more a burden on the national economy rather than an asset. It is therefore important that the Government encourage the use of technology more suited to the country's factor endowments so as to provide employment to the largest number of people. In other words preference to less capital and more labour intensive technology which could provide mass consumption goods at reasonable price and higher employment opportunities to the poorer groups of the society.

2.3.2 Small-scale industry which generally employs labour-intensive technology can act in a double capacity. In general it can be used to produce cheaper products than capital intensive modern technology, or even the same modern product at a lower cost (particularly in a relatively small market like that of Sierra Leone, where capital intensive technology cannot reap its utmost economies of scale); and creats more jobs, thus generating incomes for the purchase of these products. Thus a feed back effect is set up, with snowballing demand, income and employment. Studies conducted in Sierra Leone have revealed that small-scale activities generate not only more employment and income but also more output per unit capital than their large-scale formal counterparts, as well as could meet output objectives of the country in most cases. In view of these advantages, as far as practicable, small-scale industry should be the choice for economic development in as far as the manufacturing sector is concerned.

3. Industrial Development Planning and Implementation Methodology:

3.1. The potential and advantages inherent to small-scale industrial activities cannot and should not be ignored by the Ministry of Trade and Industry while formulating and implementing industrial developments and promotion policy. The aim should be to achieve maximum possible benefits for the national economy in terms of employment, value added, net foreign exchange saving, higher revenue for the Government and consumer relief for each dollar spent. This necessarily requires thorough comparative techno-economic analysis of small, medium and large-scale activity for the same product, their impact on the economy and then to choose the one which is most beneficial to the economy. Unless the future planning and project approvals are done by the Ministry of Trade and Industry on the above lines, Sierra Leone's hopes of economic development and saving of foreign exchange through

industrial development will remain a dream rather than reality, as has been the case thus far.

3.2. Now that the Development of Industries Act 1983 has come into effect and the Ministry of Trade and Industry now has adequate number of professional Officers in the Industrial Development Department, it is high time that the available professional man-power is fully utilized, in right earnest for the implementation of the Act and for the preparation of a more realistic and purposeful programme for industrial development promotion. Otherwise not only that the purpose of the Act will be defeated, but the Government's expenditure on IDD will also be wasted without achieving the desired results.
Therefore, it is time that IDD's directorate immediately furnish a Work-Programme and a Time-Schedule assigning the following tasks to IDD's Officers:

i) analysis of import statistics and demand forecasts;

ii) issuance and recovery of Registration/Survey Questionnaires to and from all industrial units issued with Development Certificates so far; and authenticate their replies through visits/inspection if required;

iii) techno-economic analysis of the Questionnaires and determination of their actual capacity, genuine inputs (both local and imported), problems, product costing and pricing;

iv) re-registration of industrial units by issuing fresh development certificates on the basis of (iii) and on the format suggested in the Operational Manual for IDD;

v) based on (iii) recommend to MTI for a more realistic import policy to ensure balanced distribution of foreign exchange between industry and trade, so that maximum utilization of the available manufacturing capacity could be achieved for economic gains;

vi) based on (iii) prepare periodic review of the manufacturing sector highlighting its contribution to the economy in real terms;

vii) based on (i), (ii) and (iv) prepare short-term and long-term plan and implementation schedule reflecting investment and economic impact targets.

Close co-operation and co-ordination of all the three Divisions is required in the above exercise and for achieving purposeful results, effective guidance and monitoring by the IDD's directorate is a must.

4. Priorities and Choice of Capacity:

The serious problems such as - precarious unemployment situation, acute scarcity of foreign exchange, declining food production (specially rice and palm oil which are staple food for the local population), energy crisis which is not likely to ease in foreseeable future, and the shyness of the flourishing trade sector to invest in manufacturing (example: US$31 million defered payment facility @ 10% of interest, offered by the Government of India for a cane-sugar project on turn-key basis could not be utilized even after the laps of 18 months, mainly because of the lack of interest by trade sector) facing the economy necessitate that the Government considers establishment of more than one smaller capacity units spread over a period for meeting the demand targets.

This approach has better chances of success than single larger capacity units. Moreover it is likely to economise both capital investment as well as operational cost, while at the same time will enable the sharing the gains of industrial development by more than one geographical region of the country.

Top priority needs to be given for industries which are resource based, that could help increase production of basic essential needs of the majority of the Sierra Leonean population and have greater potential for employment, import substitution and export. Financial limitations of the country demand that stress should be on rehabilitation and maximum utilization of the available capacity first and then going in for new ventures, especially in case of medium and large scale industries.

4.1 Palm Oil

Red palm oil is one of the essential food items for the people in Sierra Leone. The present annual demand is estimated at 68,000 tonnes (58,000 for human consumption and 10,000 for industrial use). The present production capacity is estimated at 41,500 tonnes per year (23,500 in the milling sector and 18,000 tonnes in the traditional sector), while the present production is only 29,750 tonnes per year (11,750 in the milling sector and 18,000 in the traditional sector). The resulting gap between demand and production is for 38,250 tonnes per annum, part of which is met by importation of edible oils and fats.

The serious disparity between production and demand warrants immediate measures to reduce the gap. Recommended measures are:

i) rehabilitation of Pioneer Oil Mills - this involves US$150,000 (approximately 50% in foreign currency) and will enable 5-Pioneer Oil Mills to be brought back to their original capacity. These mills even though are very old, but if rehabilitated and managed well, could remain in production for another 5-7 years;

ii) establishment of additional capacity for 30,000 tonnes of red palm oil per annum during the next 5 years, in the following manner:

		Estimated Capital Cost US$
a)	2000 rural units: 10.5 tonnes Oil/year, based on manually operated equipment designed by IDD with UNIDO assistance, for an aggregate production of 21,000 tonnes Red Palm Oil/Year. Employment: 8000, Export: 1050 tonnes kernel/year.	3 million (foreign component of 0.5 million)
b)	18-mini-mills: 500 tonnes oil/year, using wood fired steam prime movers. Aggregate production 9,000 tonnes oil/year. Employment: 594, Export 450 tonnes palm kernel/year.	4.5 million (foreign component of 2.1 million).

Additional employment opportunity in agriculture, transportation, trade, etc.

4.2. Paper and Paper Board

Paper and paper board are essential needs for education, health, industry and trade sectors. Their availability is getting scarce and more expensive every day. Moreover the country has to spend considerable foreign exchange on their import. It was from these consideration that IDD proposed a study on the production of paper and paper board based on rice straw.

A team of Canadian Consultants funded by the Islamic Development Bank has submitted a Feasibility Report on such a unit recently. A 25 TPD paper and paper board mill based on collected rice straw as major source of raw material as well as fuel for power and process steam has been recommended, involving US$26.25 million capital investment, for meeting the demands of the Mano River Union Member countries.

Considering the country's insufficiency in rice (the staple food) and the small size and scattered rice cultivations, which makes collection of rice straw difficult and expensive, it is recommended that the paper mill/s develop their own rice plantations. In this way the country could have more rice and the mills ensured supply of rice straw at nominal cost than otherwise. Thus saving of foreign exchange on import of rice and on extra fuel required for collection of rice straw from longer distances.

For reasons discussed earlier, it is also recommended that instead of 1-25 TPD Mill, 2-12 TPD pulp and paper plants based on Chinese technology may be considered for establishment over a period of 5 years involving US$ 22 million capital investment on the 2 mills and their supporting rice plantations. This way saving of US$4.25 million on capital investment on one hand and additional availability of 5000 tonnes of milled rice per year on the other hand, thus result in a saving of US$2 million on rice import annually.

4.3. Fish Preservation and Smoking

The protein deficiency in the dietary requirements of the people in Sierra Leone has been repeatedly reminded by national as well as international experts. Because of the difficulties in preservation and transportation of fish the protein deficiency is all the more apparent in rural areas. A CFTC Feasibility Study on the subject has recommended establishment of at least 4 units of 1 tonne/day capacity for fish smoking and cold storage, each at a capital investment of £300,000. An investment agency in UK has also in principle agreed to provide long-term loan up to £1 million for this industry. This opportunity should not be lost. However, possibility of utilizing the available idle cold storage capacity of 1,000 tons at the Integrated Fish Mill Co. should be explored. This is likely to bring down the capital investment on the recommended units considerably.

4.4. Sugar

CFTC Feasibility Report on sugar production in Sierra Leone has recommended expansion of the Magbass Sugar Mill to 10,000 tonnes of sugar per annum, and also for the establishment of a 1,250 TCPD (15,000 tonnes of sugar/year) capacity with possibility of expansion to 2C,000 tonnes of sugar/year, for meeting Sierra Leone's sugar needs by 1995 which is estimated at 30,000 tonnes of sugar per annum. The proposed new mill with infrastructure and its supporting plantation is estimated to involve US$37 million capital investment with a foreign currency component of US$31 million. The Government of India had in principle agreed for $31 million defered payment at 10% interest turn-key project facility. The Government of Sierra Lecne has yet to take a decision in the matter.

Because of the foreseen difficulties in raising US$6 million local currency component involved in this large project, it is worthwhile to consider establishment of 4-300 TCD capacity mills during the next several years, instead of the proposed 1,250 TCD mill.

Besides China and Holland, India is also producing 150-300 TCD capacity sugar plants based on vacuum pan system, as used in large sugar mills for production of mill white sugar. Indian credit offer could as well be utilized for smaller mills.

The capital investment involved in 4-300 TCD mills with supporting cane plantations is estimated at US$28 million. Thus not only that the capital investment could be brought down by US$9 million for achieving almost the same required capacity, but the benefits of development could be spread over more than one region of the country.

4.5. Building Material:

Housing problem is basically an income problem. Availability of resource based low cost building material in the country will not only reduce the housing problem but will also help reduce foreign exchange expenditure on import of building material.

The major imported building materials are - cement, clinker, galvanized iron roofing sheets and asbestos-cement/cast iron/PVC sewage piping, and their average annual imports are:

Material	Quantity M. Tonnes	CIF Value US$(million)
Cement Clinker	80,000	7.22
Galvanized Roofing Sheets	3,000	2.10
Sewage Piping	2,900	0.65
-	- Total US$	9.97 M/Annum

Use of fired clay bricks, roof and floor tiles as well as salt-glazed fired clay sewage pipes is quite common in many parts of the world, especially in countries which do not have lime stone deposits for the production of cement. Large deposits of good quality clay have been identified near Bo, Kenema, Lunsar and Makeni. Properly moulded and fired clay bricks, roofing/floor tiles and salt glazed fired clay pipe can very satisfactorily substitute concrete blocks for permanent housing, galvanized iron sheet, imported floor tiles and sewage pipe. Such substitution is estimated to save minimum of US$2.75 per annum, in addition to a saving of 9,600 tonnes of cement which could be diverted for the construction of 40 miles of 18 feet wide permanent concrete road per year or for the construction of bridges and mini-hydro-electric/irrigation projects.

The proposed substitution will require production of 29 million fired clay bricks (9" x 4½" x 3"), 19 million roof/floor tiles and 70,000 rft. – salt-glazed fired clay sewage pipe per annum, which can be achieved by 100 small-scale units, each equipped with 1-hand operated moulding machine. Clay products will be fired in clamps using firewood and agro : waste as fuel instead of imported fuels.

The capital investment on such a programme is estimated at US$ 1 million with a foreign exchange component of US$0.8 million and employment potential for 2,000 persons.

4.5. Agricultural Implements

One of the reasons for the declining agricultural productivity in Sierra Leone is inadequacy in agricultural implements, especially agricultural hand tools. Due to the scarcity of foreign exchange, import of these tools has come down almost to a halt, and the depleting steel scrap (railroad rails/slipers and vehicle suspension springs) has brought down the manufacture of these tools by rural blacksmiths to less than 20% of their former annual production.

According to CFTC Consultant's Report on manufacture of agricultural implements, the annual demand for agricultural hand tools in Sierra Leone is 684,000. The smallest manufacturing plant for agricultural hand tools will have a production capacity of 1.5 million tools per year (economy of scale) on 3-shift operation. The capital investment involved is estimated at US$ 3 million and recurring annual foreign exchange on raw material: US$500,000, spare parts and tooling: US$338,000. The plant will be consuming 1.975 million KWH electrical energy (equivalent of 5,400 M. Tonnes of diesel oil), 3300 gallons of furnace oil and 2,200 gallons of kerosene per year. Maximum plant utilization for meeting Sierra Leone's demands would only be 46% of the plant's capacity. Thus increasing the product

cost considerably. Handtools are the predominant agricultural implements in use in Sierra Leone today and will continue to be important in the foreseeable future. The Consultant has, therefore, recommended rightly that for some time to come the country will continue to be dependent on village blacksmiths.

Development and promotion of rural blacksmiths will go a long way in Government's efforts for economic development and serve dual purpose - i) help increase agricultural production and ii) rural development.

For meeting country's requirement of agricultural hand tools it is recommended that 666 rural blacksmiths are upgraded by providing better tools and ensuring steady supply of SAE 1075 grade water hardening steels at reasonably price.
Such a programme will involve a Capital Investment of US$1.7 million, and an annual foreign exchange of US$500,000 on raw material and US$76,500 on replacement tools, and with a potential for employing 2,000 persons and an annual import substitution to the extent of US$1.4 million, without consumption of any imported energy at all.

4.7. Growth Centre Programme for Rural and Small-Scale Industry:

The Growth Centre Programme is a Basic Needs Strategy approach for economic development through the development and promotion of rural and small-scale industries.

It is mainly focussed on creating employment and income generating opportunities for the poorer groups of the society through production of basic and essential needs (such as - cassava gari; red-palm oil; agricultural implements; low-cost building material, clothing, soap and fuel) of these groups, majority of whom are in rural areas, and thus help in raising their living standard on one hand, and the development of indigenous entrepreneurial capabilities on the other, to serve as a

seed-bed for future industrialization of Sierra Leone by Sierra Leoneans.

The Programme was evolved and initiated with UN's financial and technical assistance through UNDP and UNIDO in 1985. In addition to technical assistance, UNDP till June1986 has funded US$350,000 for the purchase of equipment, tools, construction material, raw material etc. required for the implementation of the programme.

The present scope of the programme is limited to 4-places i.e., Binkolo, Kpandebu, Pujehun and the Western Area, involving the establishment of 112 small-scale enterprises for the production of basic needs and to render repair services at these places and in 40 villages.
Salient features of the programme are:

i) direct employment potential: 368 persons (cost of equipment and tools per worker: $408);

ii) annual output value at prices of June 25, 1986: US$ 897,800

iii) annual contribution to GDP: US$ 407,600

iv) average value added: 45.4%

v) import substitution: US$400,000 per year;

vi) increase in wages: 57% as compared to prevailing wages in rural areas;

vii) relief to consumers: 24% as compared to prevailing retail prices.

The programme which is still in initial stage of implementation has already created enthusiasm among the rural population and has started producing results - 136 new small-scale entrepreneurs comprising of men, women and the disabled, assisted directly or indirectly by the

programme, are already in business of producing soap, garments, furniture, agricultural implements and building material, and some of them are earning Le25-80 per day.
The programme has great potential for employment and income generation for the rural population as well as for import substitution. If expanded to cover large area of the country, could definately help solve unemployment and income inequality problems facing the country to a considerable extent. As such, this programme deserves full support both from the Government as well as from international and bilateral aid agencies.

Government support could be in the form of duty concessions at least to the same extent as enjoyed by formal industrial sector if not more. Part of foreign aid may be diverted for expansion of this programme and part may be used for import of replacement tools and essential raw materials for small-scale enterprises sponsored by this programme.

4.8. Need for Technology Adaptation and Skills Upgrading

4.8.1 Technological sophistication does increase production and quality and reduces labour consumption through mehcnaization and automation. Sophistication also reduces the need for higher skills in mass production, however, this often requires very large capital investment.

4.8.2 For developing countries like Sierra Leone, it is essential to manufacture with low capital investment. It is also usually necessary to produce products which may be adapted to local conditions. Thus, it is frequently not possible to justify a high level of mechanization or automation for the relatively small volumes which prevail in Sierra Leone.

4.8.3 To obtain high product quality from low volume production, it is necessary to have production skills and the ability to design, make and service equipment; tools; dies and production aids. This is so, because, equipment and tools adapted to the requirements of developing countries are difficult and expensive to have made in industrially advanced countries. The manufacture of such tools is very labour-intensive and their manufacture can thus eventually be made competitive in developing countries. Furthermore, products can often be redesigned/ simplified to accommodate for less capital intensive production. Thus it is essential to pay due attention to indepth skill development and engineering, and not simply to think in terms of vocational or operator training.

4.8.4 Strengtheining of the metal working capabilities in Sierra Leone is fundamental to supporting the country's efforts in industrial development. Without this capability, one can hardly imagine a viable technical independence of Sierra Leone from the industrialized countries. Metal working industry is the king-pin in any attempt at industrialization, because it can supply parts and tooling systems to the entire manufacturing sector as well as can provide service to other sectors of the economy. At the same time it can also supply essential consumer durable goods and eventually intermediate and capital goods also.

4.8.5 In the developed countries, the facilities for engineering and tool making come from various specialized companies. The transnational companies have self-sufficiency in this respect.

For developing countries it is rarely commercially justified to have a company that will be self-sufficient in these facilities, nor is it justified to have specializ companies for providing these services. For these reasons, the initial nucleus of such services must be a central common facility unit to which technical assistance has been provided. The

technical assistance will help develop the required engineering and skills. Initially, it may not be possible to fully exploit the facilities; however, a facility can be created that will have a multiplier effect and enable to assist existing industries to help themselves and in creating new industries and product lines. The presence of such a unit will create technological infrastructure and facilitate overseas investment. Most important, if such a unit is thoughtfully planned and efficiently managed, could not only adapt appropriate technology; design and make local resource based small industry equipment; manufacture spares and production tooling; render repair and reconditioning of equipment and tools but at the same time provide on the job training for upgrading production skills and engineering capabilities of the nationals and thus serve as a source of supply of technological development/guidance and highly skilled engineers and technicians needed for industrial development and expansion.

4.8.6 There is enough market in Sierra Leone for substantial number of small and medium-scale industrial equipment as well as for spare parts for industrial, agricultural, construction, mining and transport equipment worth millions of dollars. If these items are progressively made and reconditioned in the proposed facility, then it could not only support itself but could also generate enough surplus for further development of technology, while at the same time could save considerable foreign exchange for the country.

4.8.7 some attempts were made for utilizing the National Workshop to serve as a nucleus metal working and technology centre to support the manufacturing sector in particular and other sectors in general, however, due to various reasons these attempts did not succeed, and the National Workshop could not provide qualified service to any of the productive sectors in the true sense. With the result that most of engineering has

still to be imported with equipment, tools and parts. Even if some simple equipment, and parts are made in the Workshop, they are too exepnsive, quality poor and reliability doubtful. With the privatization of the Workshop it is doubtful if the bopes of utilizing the Workshop for technological development and skill upgrading could be fulfilled at all in Sierra Leone, unless alternate facilities are established.

4.8.8 Therefore, the Government is advised to seek assistance from international or bilateral aid agencies for the establishment of the proposed facility on a modest scale; which will involve a total investment of US$1.5 million including capital cost, expertise for technical assistance and operational expenses for a period of 3 years. In 3 years time the facility could become self supporting. A project document on the subject is already available in the MTI's files for necessary follow up.

4.8.9 Urgent need for the establishment of industrial research and development facilities in Sierra Leone has also been stressed by eminent scholars from time to time. It is admitted that without research our planet would not be what it is today. However, how can a country like Sierra Leone, faced with serious problems such as - unemployment, insufficiency in food, energy crisis and scarcity of foreign exchange, effectively participate in basic industrial research? What are the chances of success of basic industrial research in a country which unfortunately has not been able to develop capability even for proper maintenance and repair of equipment?

Much research has been and is being done by the United Nations Agencies and also by friendly countries in Africa and abroad on commercial application in Africa and on African resources. Most of these are available at nominal cost if not free. So why not utilize the proven results?

For quite some time to come, the need in Sierra Leone will mainly be for applied industrial research in the fields of developing indigenous capability for adaptation, modification and simplification of technology to suit local conditions and requirements, for upgrading engineering skills to enable maintain, repair and reconditioning of equipment for its maximum utilization and in the development of manufacturing/ fabrication techniques for indigenous production of equipment and spare parts of quality and reliability with least wastage of inputs.

These are the main considerations for recommending the establishment of technology adaptation and skills upgrading facility in Sierra Leone. Government is urged to take a realistic view in making a choice.

II. SUMMARY OF ACTIVITIES AND RESULTS

A. IMPLEMENTATION PLAN FOR THE GROWTH CENTRES PROGRAMME

1. Since the original proposal for the establishment of a National Industrial Extension Set-up for the development and promotion of small-scale industry in December 1982 could not enlist support from non-governmental aid agencies, nor the expected EEC aid was forthcoming, a more realistic and workable implementation plan for the establishment of four Growth Centres for the development and promotion of small-scale industry was prepared by the Industrial Engineer, to be financed from the budget of UNDP/UNIDO project DP/SIL'83/001 and with additional US$ 110,000 from UNDP sources.

1.1 This exercise involved:-

i) identifying essential basic needs of rural population; crafts and trades practised in rural areas;

ii) selecting need/resource/import substitution based viable small-scale industrial activities best suited to local conditions and that could generate employment and higher incomes for the rural population;

iii) determining the size and type of work place, quantify equipment, tools and raw material required for each small-scale unit and for the common facilities, with cost estimates;

iv) preparation of commercial/economic viability for each small-scale activity proposed for the programme;

v) determination of technical assistance support needed for implementation of the programme;

vi) budget for 2 years (1985-& 1986) for UNDP funding;

vii) implementation work schedule; and

viii) designing management aids - formats for equipment and raw material inventory, production costing, production/sales/stock inventory cash book and profit and loss accounts.

ix) equipment lay-out plans for 8 small-scale industrial activities and for production-cum-upgrading workshops of the Growth Centres.

1.2. Salient Features of the Plan:

i) Total cost: US$350,000 (over a period of 2 years) under UNDP budget lines 41 and 42.

ii) Total number of enterprises: 112 during 2 year period. 24 enterprises attached to the 4 Growth Centres and 88 to be owned by individual rural entrepreneurs.

iii) Direct employment potential: 368.

iv) Average cost of equipment per worker: $408 = (Le2,040).

v. Distribution of enterprises by categories:

Category	Number of Enterprises	Product and Services
Agro-supporting/ import substitution essentially needed	50	Agricultural hand tools, rice para-boilters, grain storage bins, oil storing drums, and repair services for agricultural implements. 60,000 implements/year
Agro-based (Food)	6	Cassava gari and red palm oil 169 M. Tonnes Gari and 31.2 metric tonnes of palm oil
Agro/need based (housing)	6	Construction wood work, furniture and supplimentary components for agricultural tools and implements. 2025 cu. ft. of wood work per year.
Agro/need based/ import substitution. (energy for cooking and for rural forging)	3	270 metric tonnes of charcoal to substitute 185 M. Tonnes of kerosene oil or 172 M. Tonnes of L.P.G. per year for cooking.
Mineral/import substitution based (housing)	6	540,000 fired-clay bricks for low-cost permanent housing, to substitute 32 M. Tonnes of imported cement per year.
Need Based	35	576,000 meters cloth and 22,800 garments per year.
Agro/need/import substitution based (health)	6	90 Metric Tonnes of soap

vi) Annual output at prices of 25 June 1986: Le 4.498 million (US$897,800)

vii) Annual contribution to GDP: Le2.038 million (US$407,600).

viii) Average value added: 45.4%

ix) Annual contribution to National Exchequer: Le422,390 (US$84,476) (Estimated custom duty, I.L. & I.E. fee on imported raw material).

x) Estimated foreign savings per year: Le 2 million (US$400,000) (as a result of import substitution).

xi) Estimated increase in wages of workers: 57% over the present prevailing wages.

xii) Relief to consumers: 24% (average) as compared to present retail prices.

xiii) Total cost of imported fuels and oils: US$981 CIF (Le4905) per year.

1.3. Results:

i) The Growth Centres implementation plan as proposed was accepted by the Government of Sierra Leone, UNIDO and UNDP, and the needed funds provided by UNDP.

ii) Construction of production-cum-upgrading workshop - sheds for the 3-Provincial Growth Centres has been completed and production-cum-upgrading activities in weaving, carpentry, soap making and tailoring has been initiated on a modest scale.

iii) Equipment, tools and raw material requisitioned through UNIDO Headquarters has started arriving.

iv) Growth Centres management committees have already been formed and local crafstmen have been identified for upgrading.

v) 60 individual craftsmen/women/disabled persons are already in business through the Growth Centre Programme assistance and 76 other individuals have established their own soap manufacturing business through projects technical assistance and personal efforts of the Deputy Director, Small Industries Division.

B. ADVISORY ASSISTANCE TO MINISTRY OF TRADE & INDUSTRY

1. Preparation of a Government Request for Japanese Assistance (grant aid) for the establishment of 44 gallon steel drums manufacturing plant.

2. Prepared Functional Duties of all Officers of the Industrial Development Department, which can also be a basis for a work plan for IDD.

3. Provided guidance to Deputy Directors Planning and Operations Divisions of IDD in analysing import statistics and questionnaires forms when received from industrial units.

4. Product costing for powerloom and handloom fabrics was prepared and furnished to Small Industry Division for pricing of fabrics produced at Tower Hill.

5. Assisted the Deputy Director, Small Industry Division in preparing a paper "Problems and Prospects of Small-Scale Industry in Sierra Leone" for ILO/Chamber of Commerce Seminar held in Freetown.

C. DIRECT ASSISTANCE TO INDUSTRIAL UNITS

1. Khadijatu Konteh's Tailoring Unit, Freetown, (4 tailors and 1 trainee).
Due to poor lighting resulting from frequent and extended electric supply interruptions, the productive time had gone down to 30% (2.4 hours in a day). Got the interiors painted white and re-arranged the lay-out of cradle operated sewing machines. This has enabled the unit to achieve 7 hours (87.5%) production time per day and also 100% saving of electricity bill.

Product costing for school uniforms, under-garments and ladies dresses was prepared for the unit and the proprietress was instructed in proper maintenance of production and sales, inventory and profit and loss accounts.

2. Alphus Cookers, Freetown.

Products: energy saving charcoal cookers.
Redesigned the cooker to achieve higher thermal efficiency (effective heat) by providing ash + clay insulation, and saving of imported steel used for fabrication which has resulted in 15% cost reduction. Alphus Cookers are in great demand in Sierra Leone. Costing and pricing of the products was also done for the unit.
The unit was also assisted in the fabrication of soap equipment to utilize the unit's surplus capacity.

3. Sayenu Garment Factory, Freetown: This unit had been assisted through UNIDO consultancy (DP/SIL/83/602) during 1984.

During a visit to this unit I discovered that the unit had a stand-by diesel-electric generator, a relatively large diesel-fired steam boiler and also a smaller electric steam boiler sufficient for the small, but changing amount of steam, for garment pressing. The latter was not in use. The owner was advised to use the electric boiler instead of the diesel-fired boiler to eliminate un-necessary waste of imported diesel fuel and also to help reduce operational expenses.

Mr. Foday Sesay the owner requested for assistance in streamlining both the production and management of his factory. A request to CFTC for short-term consultnacy for this unit and also for women's programme has already been initiated.

4. A small fired clay bricks unit at Lunsar: The brick klin errected by a Danish Civil Engineer collapsed during the first trial firing. A sketch drawing of a brick firing clamp was provided. The unit is now about to produce 1,500 properly fired clay bricks per day.

D. ASSISTANCE TO INTERNATIONAL AND BILATERAL AGENCIES AND CONSULTANTS

1. World Bank Consultants on viability of a financial institution (NGO) in Sierra Leone for the development and promotion of small and medium-scale industries.

2. CFTC Consultant on Manufacture of Agricultural Implements in Sierra Leone. The Consultant fully supported the writers recommendation for multiplying and upgrading rural blacksmiths instead of a factory unit which cannot be viable due to economy of scale in a small market that of Sierra Leone. The Consultant also agreed on the material to be used for agricultural implements i.e., SAE 1075 carbon manganese water hardening steel as recommended by the writer.

3. CFTC Consultants on Palm Oil and other edible oil production in Sierra Leone. Production capacities, process flow, detailed specifications and estimated cost of mini-palm oil mills was furnished to the Consultants. The Consultants during discussions have also concurred the writers views that the pioneer mills if rehabilitated and properly maintained and managed could operate to their designed capacity for at least another 5-7 years, and in view of the typical condition of the economy

further expansion of palm oil production should be achieved by establishing additional mini-mills and promoting hand operated rural equipment. Final report is awaited.

4. UNIDO Adviser on Metallurgical Industry: Prepared a summary on the need for a technology adaptation and engineering skills development facility in Sierra Leone, as a background material for the donors conference.

5. UNDP Sierra Leone: A proposal for the establishment of an automotive equipment repair and reconditioning facility for UNDP and other UN Project vehicles and also for privately owned vehicles, agricultural and construction equipment.

6. UNDP Sierra Leone: Three alternative proposals for continuation of Growth Centres Programme and its future expansion for the period July 1986 to June 1988.

7. SIDFA, Sierra Leone: Feasibility of Robinki as a site for locating UNIDO funded Cassava Gari Production Plant. Suggested a smaller capacity (3.6 tonnes of cassava root per day, instead of 7-9 tonnes as suggested by UNIDO Consultant on Gari Production in 1984), plan for progressive planting/weeding/harvesting of cassava to enable the gari plant to function at least for 6 months in a year, costing of cassava and gari production, and capital cost, working capital and profitability have been furnished.
National Development Bank of Sierra Leone has shown keen interest for financing the project. SIDFA has arranged for the preparation of a legal document involved in the formation of a company.

8. Local Consultant on the requirements of spare parts for the rehabilitation of 'Pioneer Palm Oil Mills: Provided guidance to local consultant on the selection of material and manufacturing processes for mill parts to be made locally, and on specification of parts to be imported etc.

9. SIDFA, Sierra Leone: Technical comments on the local consultant's draft report on rehabilitation of 'Pioneer' Palm Oil Mills.

10. SIDFA, Sierra Leone: A summary on the commercial viability of Growth Centres.

11. UNCDF: M/S J.B. Marta of UNCDF New York who is preparing a Project Document for UNCDF funding for the establishment of production-cum-training workshops for UNESCO Project DP/SIL/85/009, was explained details of Growth Centre Programme, its management and operational aspects, main industrial activities proposed, the commercial viability of the programme and technical assistance involved. At her request list of equipment and tools and their cost for 8 small-scale industrial activities, plans and drawings of soap making, charcoal making and palm oil extraction equipment designed by Project DP/SIL/83/001 were furnished to her.

12. HABITAT Consultant: Furnished demand estimates for C.I. Sheets, cement, structural steels required for housing sector and also cost estimates for small and medium scale production units required for housing sector.

E. TRAINING OF NATIONAL COUNTERPARTS

1. Induction Training: The following 3 newly recruited Officers of IDD were assigned to the Industrial Engineer for 3-weeks induction training:

Mr. N. T. R. Sylvah - Senior Industrial Engineer, Small Industry Division.

Mr. J.W. Jackson, Industrial Development Officer, (Economist) Planning Division.

Mr. B. Jayah, Industrial Development Officer (Cost Accountant) Industrial Operations Division.

They were appraised of:-

1.1. the need for industrial development and planning;

1.2. the necessity of establishment of IDD and its role in purposeful and economical industrial development planning and implementation to ensure achievement of maximum possible development targets;

1.3. the need for close and effective consultations and co-ordination between IDD and the Trade Division of MTI, to check unnecessary waste of scarce foreign exchange by the trade sector at the cost of strangulating the industrial sector to ensure that maximum utilization of available industrial capacity on one hand and adequate availability of mass consumption goods in the country on the other;

1.4. the most critical problems faced by the economy i.e., the enormous and increasing gap in the distribution of income, the precarious unemployment situation, acute shortage of foreign exchange, insufficiency in food grains (rice) and energy crisis that have to be considered in adapting industrial development strategy, its planning and implementation so that these problems could gradually be solved;

1.5. a simple methodology for industrial planning in a chart form giving steps (What, How and When) involved in such an exercise was also provided to all counterparts, and steps involved in the exercise - analysis of import/export statistics; demand and shortfall forecasting, preparing profiles and prefeasibilities for small, medium and large scale units for the same product along with their respective impacts on the national economy in terms of employment generated; capital cost per employee; value added; contribution to GDP; net foreign exchange effect; effect on Government revenue; increase in the workers' income and relief to consumers, were demonstrated, so that priorities could be determined, size and number

of units recommended for inclusion in the development plan with investment (both local currency and foreign exchange) involved. A previously worked out chart illustrating comparative investment and anticipated benefits for small, medium and large-scale units for the production of clay bricks and tiles, palm oil, agricultural implements, garments, textile weaving and cassava gari was also provided to them as reference materials.

2. In-Service Training of Counterparts

The following Officers of the Industrial Development Department worked with the Industrial Engineer from time to time as his counterparts:-

i) Mr. M. A. Tunis, Dy. Director, Small Industry Division,

ii) Mr. A. A. Ahmed, Dy. Director, Planning and Statistical Analysis Division,

iii) Mr. S. S. Kamara., Dy. Director, Industrial Operations Division,

iv) Mr. F.O.B. Walan, Senior Industrial Development Officer, Small Industry Division,

v) Mr. N. R. T. Sylvah, Senior Industrial Engineer, Small Industry Division,

vi) Mr. J.W. Jacksnon, Industrial Development Officer, Planning Division,

vii) Mr. B. Jayah, Industrial Development Officer, Operations Division,

viii) Mr. A. J. Jalloh, Senior Industrial Engineer, Operations Division,

ix) Mr. F. M. Lewally, Industrial Development Officer, Planning Division.

2.1. Guided the counterparts in analysing Import/Export Statistics, their application in project preparation, industrial planning, and the comparison of the CIF values of imports/exports with international prices, to help Government in checking pilferage of foreign exchange and evasion of custom duty by importers through under-invoicing and over-invoicing.

2.2. Explained the purpose of Industrial Registration/ Diagnostic Survey Questionnaire, their analysis and the use of results obtained in determining their genuine import requirements, production potential and their problems, so that the Government could be advised for adopting suitable corrective measures, realistic import policy, and to help IDD in realistic industrial development planning.

2.3. Every effort was taken to involve the counterparts in the preparation of industrial profiles, prefeasibility studies, direct assistance to industries and in the preparation of the Implementation Plan for Growth Centres Programme. But unfortunately due to their pre-occupation in administrative and other non-professional matters assigned to them by their superiors, most of them were unable to fully participate in these tasks. However, counterparts have been provided with copies of documents, reports, studies, design calculation and manufacturing drawings of equipment developed and its operational instruction for their guidance.

2.4. A Reference Guide for selection of equipment and power requirements for composite mini-oil mills and cassava processing equipment, their prices and suppliers' addresses was prepared and copies furnished to counterparts.

2.5. Useful data on oil yield of various oilseeds, gari and starch yield of cassava, allowable time between harvesting and processing, fuel consumption per/hp/hr. for prime movers and miles/gallon for haulage equipment and agricultural tractors and mining equipment, weight volume ratios of oil palm bunches and fruits; cassava root, gari, rice, rice straw; clay; firewood; charcoal etc., comparative heating values of various fuels etc., that would help counterparts in the preparation of prefeasibility studies and project appraisal, were compiled and provided to counterparts.

2.6. A copy of a techno-economic feasibility of a small-scale industry estate with 15 industrial activities and common facilities (which was prepared for the Tanzania Investment Bank by the industrial engineer during his previous UNIDO assignment) was also made available to the counterparts to help them in planning industrial estates for Sierra Leone.

3. <u>UN Fellowship Training for Counterparts</u>

Four applied training courses were identified for fellowship training of counterparts:-

1.	Mr. N.R.T. Sylvah, Industrial Engineer.	Six months training in design of small industry equipment and manufacturing practice at the Centre for Industrial Studies, University of Technology, Loughborough, U.K.
2.	Mr. A. J. Jalloh, Industrial Engineer.	Twelve weeks applied course in industrial maintenance management in India.
3.	Mr. J. W. Jackson, Industrial Economist.	Six weeks applied course in small scale industry development planning in India.
4.	Mr. M.F. Lewally, Industrial Economist.	Twelve weeks applied training in Industrial Project Evaluation in Japan.

Mr. Sylvah has already completed his training and is due to return to Freetown during the first week of July, 1986. The other three cases are in process.

4. Appropriate Technology Development

4.1. This activity was initiated in 1983-84 from the consideration that it could help the country in taking a start towards small-scale capital equipment manufacturing on one hand and on the other to provide an opportunity to the nationals for upgrading their capabilities in engineering design and manufacturing practices, and was also continued during 1985-86.

4.2. The Laundary Soap Equipment that was developed, tried out and its profitability demonstrated during 1984, has started producing results. As of January 25, 1986, 76 units based on the design have already been established and are in business. The aggregate production capacity of these units is 1,140 tonnes of laundry soap per year which could take care of almost 50% of the present shortage in Sierra Leone. Personal efforts of the Deputy Director, Small Industries Division are to be commended for popularizing this industrial activity.

4.3. Improved Rural Palm Oil Extraction/Clarification Equipment

Adequate information and data related to weight/volume ratio of FFB and FF, and temperature/pressure limitations involved in the process, which are essential for batch size matching in process equipment, are not to be found in consultancy studies on Palm Oil Industry, done so far for Sierra Leone. Such information had to be collected from research work done on the subject in West Africa by the Tropical Institute of UK and Dr. N.D. Wadhwa.

Using this authentic data, an improved and more efficient rural palm oil extraction and clarification unit was designed to be fabricated locally. For the benefit of the counterparts, copies of detailed design calculations, 20-manufacturing drawings and operation instructions have been provided to the counterparts and technical UNVs. Every effort has been taken to furnish the minutest design detail - strength of screw threads/welded joints; buckling and breaking strength of machine elements; bursting pressures; bearing, automatic safety lock system, powerloss in friction, effort required and pressure exerted etc. This should enable the counterparts to design more complicated equipment.

The design is based on use of such material for fabrication that is generally available in the local market. This was done to develop the capability of counterparts in improvization techniques.

4.4. Design of Transportable Charcoal Kiln

Due to the scarcity and increasing price of kerosene and L.P.G. (imported fuels) in Freetown and other urban areas, the demand for charcoal as well as for the energy saving charcoal cooker (develcped with the assistance of UNIDO Expert in the Project), has increased many fold and price of charcoal is increasing every day. To help reduce these problems a transportable charcoal kiln was designed based on the most simple technology and yet more efficient and time saving than the traditional pit and earth clamp method.

The production capacity of the kiln is 500-750 kg. of charcoal per batch every two days depending on the density of raw material (forest wood) used.
Annual production of 90 tonnes of charcoal from each kiln could replace imported fuels to the extent of 61.6 tonnes of kerosene or 62 tonnes of furnace oil or 57.3 tonnes of L.P.G.

Copies of eight manufacturing drawings and operation instructions have been provided to counterparts.

Three such production-cum-demonstration units have also been included in the Growth Centres Programme. Capital cost (including equipment and wood and charcoal store) is estimated at US$2,700; annual profit of Le21,700 at ex-work selling price of Le10.5 per bag of 10 kg., while th retial price in Freetown would be around Le15-16 per 10 kg. bag as against the prevailing retial price of Le20 per bag of 10 kg. Thus 21% relief to consumers.

Delay in the delivery of equipment for Growth Centres Implementation Programme has resulted in upseting the implementation targets. Prompt attention to such equipment oriented field projects by the purchase and clearing sections of UN Agencies is needed to ensure implementation targets of such UN assisted projects.

III. CONCLUSIONS

1. The specific immediate objective of the UNDP/UNIDO Project DP/SIL/83/001 (Final Phase) was "to consolidate MTI's structure for industrial development planning, industrial operations and small-scale industry development". The anticipated corresponding output being the "establishment

of a functional Industrial Development Department to undertake initiation and assist the implementation of industrial development programme".
It must, however, be appreciated that just the establishment of the Department and placement of functionnaies, or providing it with operations manual, functional duties and responsibilities, outlines for area; feasibility studies and project appraisal etc. cannot by themselves make the Department functional. The functionaries need to be officially informed of their functions and responsibilities, properly inducted into the system, provided with periodic work-plans and targets, continuously guided, motivated and monitored by their supervisors. Only then the Department will become functional and be of use to MTI in her efforts for economic development.

It is unfortunate that the professional talent available in the Department is being wasted on administrative business or on supervison of the trade inspectors, instead of being utilized for more important and urgent task of implementing industrial development programme.

Unless the specific functions of the Department are immediately initiated and continued in right earnest, the purpose of UN assistance to the MTI as well as that of the Development of Industries Act 1983 will be completely defeated.

2. Sierra Leone being a trade oriented economy, people with money (both local and expatriate) prefer to invest in gold and diamonds trading to use foreign exchange so earned on import and sale of consumer goods for making large profit quicker. And then when the value of currency is also eroding, guarantees and incentives for industrial development would never be effectively felt by the rich investor community. Therefore, for quite some time to come, MTI's stress necessarily has to be on the development and promotion of small-scale manufacturing sector and on the

rehabilitation of such sick units that are resource based and produce mass consumption goods. This approach will not only be more economical and has better chances of attracting investment, but also will help in creating more employment and income generating opportunities for the local people and thus accelerate the pace of economic development which has almost come to a halt.

The Growth Centres Programme is a step in the right direction and has potential for accelerating economic development, especially in the rural areas, through small-scale manufacturing activities for meeting basic essential needs of farmers and rural population while at the same time generating employment and income for poorer groups of the society. Even though the programme is in an infantile stage, yet it has started showing promising results. In a short period of a few months over 136 entrepreneurs have already established small-scale manufacturing units employing over 400 persons, and making daily profit ranging from Le25-80. Therefore, this programme rightly deserves full support of the Government and aid organizations. However the sponsors of the programme have to be careful in the selection of personnel (national as well as international) who will be in-charge of implementing the programme. Unless the personnel are professionally capable, vigiliant and dedicated, the success of the programme cannot be ensured.

3. The programme for the rehabilitation of the disabled at Moyamba, which was initiated by a disabled blacksmith, is providing board, lodge and training to 2 dozen disabled persons, from self-generated funds, and helping them in becoming self-supporting and respected members of the society, is commendable.

It is gratifying to note that the suggested assistance to this programme was accepted by UNDP and UNIDO for inclusion in the Growth Centres programme. Consequently substantial quantity of equipment and tools, best suited to disabled, have already been ordered through UNIDO Headquarters for Mcyamba, which has to be availed for production-cum-training of disabled. Moreover, the handicaps of the disabled cannot be overlooked also. In view of these considerations UNDP/UNIDO are urged to provide a UNV and a vehicle for this programme.