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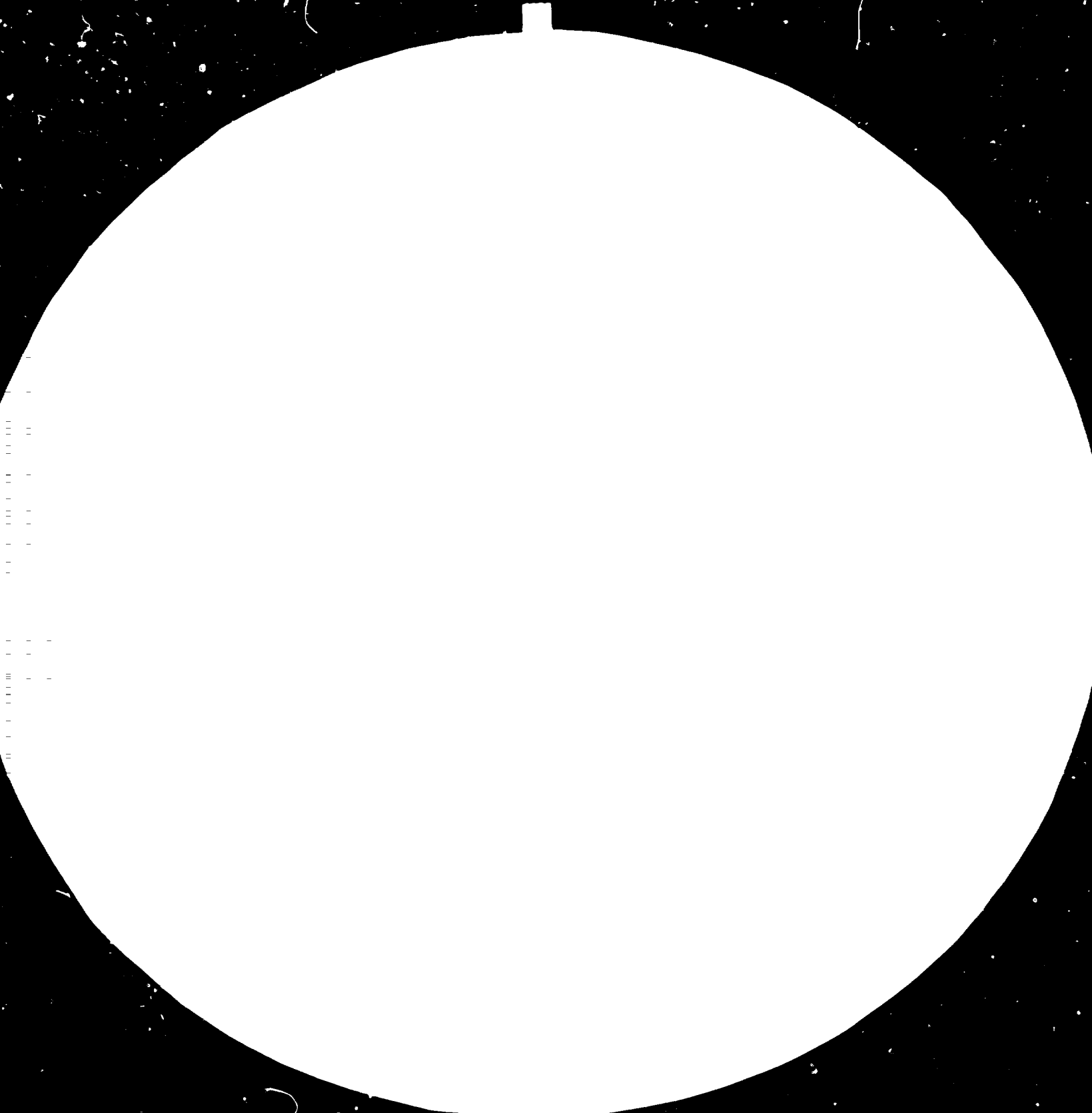
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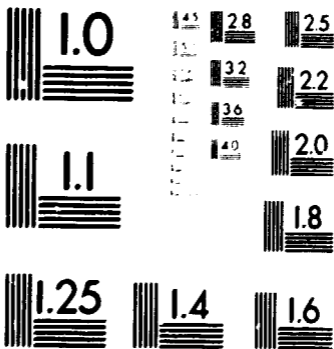
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INDUSTRIAL DEVELOPMENT PROMOTION AND PLANNING

DP/SIL/83/001

SIERRA LEONE

Technical report: Activities 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

Value of the local currency - Leone (Le) - at the end of the expert's assignment: US\$ 1 = Le 2.5

Abbreviations

UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization
MTI	Ministry of Trade and Industry, Sierra Leone
IDD	Industrial Development Department of MTI
CFTC	Commonwealth Fund for Technical Co-operation
EEC	European Economic Community
TCDC	Technical Co-operation between Developing Countries

Abstract

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

The recruited expert, Mr. M. Raza Ali, has served in the above projects as an industrial engineer from September 1982 until December 1984.

The end-of-assignment report lists the different activities of the expert and states the results. Direct advisory assistance to the Ministry of Trade and Industry, the setting up of operational support to the Industrial Development Department as well as problems of appropriate technology development have been the main subject of the assignment. The support to the UNIDO short-term consultants on mission in Sierra Leone and the in-service training of counterparts have been further activities, described briefly in the report.

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INTRODUCTION

The UNDP/UNIDO Project DP/SIL/80/007 - Planning and Promotion of Industrial Development was initiated in July 1981 and terminated in June 1983.

The main purpose of the Project was to strengthen the Ministry of Trade and Industry in establishment of Industrial Development Department and preparing Guide Lines and Organization Structure for the promotion of industrial development. Due to the economic structure of the country, special attention was given to the structural and regional extension of small-scale industries.

A full scale 3-year UNDP assistance programme for helping the Ministry of Trade and Industry 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 the rehabilitation of existing industrial units, was initiated through UNDP/UNIDO Project DP/SIL/83/001 with effect from July 1983.

The expert served in these two projects in the capacity of UNIDO Industrial Engineer between September 1982 and December 1984.

This document reflects briefly the contribution of the industrial engineer, as a member of a task force of UNIDO Experts in the two Projects in achieving some of the objectives, and his own impression on the performance of the Projects, the problems faced and his recommendations for the consideration of all concerned.

RECOMMENDATIONS

1. It needs to be realized by all concerned that no matter how much technical assistance and for how long it is provided for assisting MFI in making its industrial administration effective enough for increasing the industrial sector's contribution to the national economy, no success in that direction will be possible without, as a first step, equipping and strengthening IDD with suitably qualified and dedicated professional personnel, and without ensuring efficient functioning and full utilization of IDD's processing capabilities.
2. Line of authority, duties, responsibilities and disciplinary obligations of all officers and staff of IDD should be clearly spelt out and given to them to follow and adhered to. The procedures and forms for various functions of IDD developed and proposed by the UNIDO team should be introduced immediately and followed, after having been agreed to by the Government. These measures are essential not only to ensure efficient functioning of IDD but also necessary for the implementation of the Development of Industries Act 1983.
3. To ensure that IDD continued functioning efficiently and effectively after the phasing out of UNDP assistance, besides improvement and strict implementation of in-service training it is felt necessary to provide more fellowships for professional officers of IDD to enable them gain experience through exposure to industrial activities in practice, in other more developed developing countries. Mere academic type of courses will not be of help to them in their function in IDD.
4. The Growth Centre Programme which, even though it is still in an infantal stage, has proved extremely effective in providing direct benefits to the small craftsmen and entrepreneurs and the rural population. As such this programme needs to be assisted further.

5. Since with the recent privatization of the National Workshop, the original concept of UNIDO in utilizing the Workshop's facilities as a multi-purpose Technology Development cum-Training and Production activity has been defeated. In view of the urgent needs of such development activities for Sierra Leone's economy, UNDP should consider assistance possibilities for the establishment of a Technology and Skills Development Centre in Sierra Leone.

6. Enforcement of effective co-ordination between IDD and the Trade Division by MTT to ensure balanced and rational importation. This is essential to prevent waste of scarce foreign exchange on one hand and on the other to help utilization of idle capacity and protect and promote indigenous products.

I. SUMMARY OF ACTIVITIES AND RESULTS

A. ADVISORY ASSISTANCE TO MTI

<u>Activities</u>	<u>Results/Progress</u>
1. Comments on the Hungarian Consultant's Project Report on Modernization of the National Workshop.	Due to financial difficulties the Government has already privatised the National Workshop.
2. Proposal for Institutional Structure for National Workshop as an autonomous corporation.	
3. Guide Lines for the establishment of National Bureau of Standards.	Could not be taken up due to financial constraints.
4. Advise on the need and benefits of Sierra Leone joining the African Regional Centre for Engineering Design and Manufacturing.	Due to foreign exchange difficulties, Sierra Leone did not join.
5. Assistance to the Industrial Delegation from the Republic of Pakistan for TCDC co-operation with Sierra Leone. Reshaping and Rescheduling the assistance offer and preparing a Memorandum of Understanding.	The Memorandum was signed. No further progress.
6. Draft Proposal from MTI to the Farah Mission on Special Programmes of Economic Assistance. The Proposal, besides others includes: Sugar Factory; Pulp and Paper from rice straw; Small Industry Estate in Makeni; and Common Facility Centre for the rehabilitation of Palm Oil Mills.	Donors Conference is scheduled during 1985 to consider the proposals.

Activities

Results/Progress

7. Proposal for Obtaining Assistance from Japan under Japanese Equipment Supply Programme for Developing Countries, for National Small Industries Growth Centre and 3 Rural Growth Centres.

Timely follow up by MHI required.

8. Aid Proposal from MHI to CFTC.

Feasibility Reports by CFTC Consultants on Sugar Factory, Fruit Processing, Urena Lobata Processing and Power Looms completed. 4 Power Looms already supplied by CFTC. CFTC instructors expected in February 1985. Government decisions on others awaited.

9. Terms of Reference for Feasibility Studies on Sugar Factory; Manufacture of Pulp and Paper from Rice Straw; and Pineapple and Fruit Processing through Foreign Funding.

Feasibility Report on 1,250 TPD cane crushing financed and completed by CFTC. Feasibility on Pulp and Paper (6,000 TPF) being financed by the Islamic Development Bank.

10. MHI Proposal to EEC for assistance for the implementation of Small-Scale Industry Growth Centre Programme costing US\$1.2 million for 4 Growth Centres in 3 Provinces and the Western Area.

EEC has accepted the proposal, and the programme has already been initiated in one village as a start. Full scale implementation will start in 1985.

<u>Activities</u>	<u>Results/Progress</u>
11. MII Proposal to EEC for assistance in establishment of a Common Facility Centre for the Rehabilitation of Palm Oil Industry at a cost of US\$ 0.8 million.	Could not be presented to EEC for lack of Government inputs and the fear that as a corporation the project may not be able to sustain after EEC assistance phased out.
12. Recommendations to MII for initiating immediate actions for making IDD operational and effective in implementing the requirements of Development of Industries Act, 1983.	Effective action has been initiated by the Permanent Secretary of MII.

B. ASSISTANCE TO UNIDO CONSULTANTS

1. Assisted UNIDO Consultant in Small Industry and Entrepreneur Development (UNIDO/UNDP Project DP/SIL/80/007/11-51/31.2.A) in planning and cost estimates of Growth Centre Programme.
2. Assisted UNIDO Consultant in Palm Oil Industry (UNDP/UNIDO Project DP/SI/SIL/801). Worked at Eastern Clinic Palm Oil Mill and Soap Factory for two weeks, during which assisted the UNIDO Consultant in preparing plant layout, foundation construction, repair, erection and tryout of the second-hand automatic soap dryer and automatic soap stamping machine.
3. Assisted UNIDO Consultant on Cassava Garri Making.

C. ASSISTANCE RENDERED IN ORGANIZING IDD AND IN
ITS OPERATIONS

1. Planning Division

- 1.1. Organization Structure; Functions of 4 Divisions of IDD: Manning and Placement Plan; Job Description; Duties and Responsibilities of all Officers and Extension Personnel.
- 1.2. System; Procedure and Forms for processing registration of existing industrial enterprises and for the appraisal of applications for the establishment of new industry or for expansion/diversification/balancing/modernization of existing units, for monitoring of implementation progress; production; raw material/ fuels/ electric power/ man power utilization etc. to help in future planning to ensure better utilization of capacity and proper use of resources especially imported inputs.
- 1.3. Procedure and Forms for diagnostic study of sick units and for rendering assistance in increasing capacity utilization, highering of their productivity and product quality.
- 1.4. Organization of Typing Pool: setting minimum Typing Standards, Typing Load Scheduling and Work Progress Monitoring.
- 1.5. Transport Vehicles movement and operation cost control.
- 1.6. Procedure and Forms for official tours, transport and night allowance authorization for IDD Officers and staff.
- 1.7. Tour Report Reporting Format for IDD Officers.

- 1.8. Updating Industrial Information on Potential Industries in Sierra Leone: Cane Sugar Factory, Textile Mill, Fruit Processing, Pulp and Paper Mill based on waste rice straw from supporting plantation.

2. Operations Division

- 2.1. Preparation of 24 viable potential project proposals.
- 2.2. Evaluation of Mack Tyre Reprocessing Unit for full capacity utilization, foreign exchange saving estimate, production cost determination, life and price comparison of locally processed tyres and of imported tyres and recommendation for tariff concessions.
- 2.3. Evaluation of Metal Chrome and Construction Co.'s (a metal furniture fabrication unit) proposal for diversification to manufacture of agricultural hand tools: foreign exchange involved US\$200,000 for additional equipment, and US\$1.06 million per year for imported material. Recommended re-submission of application on IDD Questionnaire for detailed evaluation.
- 2.4. Diagnostic study of six sick industrial units and recommendations for their full capacity utilization.
- 2.5. Project Proposal for Direct Support for the rehabilitation of 3 'Pioneer' Palm Oil Mills under UNDP assistance country programme.

3. Small Industries Division

- 3.1. Training course preparation and training programme implementation for Extension Workers in blacksmithy, plumbing, metal fabrication and carpentry at the National Workshop. 4 craftsmen from Small Industry Division have already completed 12 weeks training.

- 3.2. Screening and selection of 9 potential extension workers for their placement in Small Industry Division for implementation of Growth Centre Programme.
- 3.3. Revived the fabrication and training activities in Blacksmithy; Metal Fabrication; Clay Bricks and Pottery; Carpentry and Cabinet Making; Hand Loom Weaving and Laundry Soap Making at the National Small Industries Centre in Freetown. These activities of the Centre and its 50 employees had remained idle for over 10 years.
- 3.4. Eight craftsmen, some of them trained unemployed were identified in the Provinces and assisted by providing better tools and appropriate equipment and guidance in improved manufacturing techniques.
- 3.5. Two educated metal workers were identified in Freetown, provided with drawings and guidance in fabrication of small-scale laundry soap equipment. Both of them have started manufacturing soap making equipment and furnaces against orders.
- 3.6. Two blind persons who were being trained in tailoring by a Volunteer Instructor were identified and assisted by providing them with manually operated sewing machines who are now making their own living.
- 3.7. Observing the shortage of laundry soap and its high price, especially in rural areas, an appropriate process and design of equipment was developed and tried out successfully at the Small-Scale Industry Centre in Freetown. A profile "Prospects and Profitability of Laundry Soap Production on Cottage Scale" prepared, technology and production costing demonstrated. As a result, so far 20 cottage scale laundry soap units have already started production in the Provinces and around Freetown.

The technology is based on 56% local palm oil soap stock, 9.5% imported caustic soda and 34.5% water by weight of soap produced. On the other hand laundry soap being produced by the organised industrial sector is based on 50% imported tallow, 17% imported caustic soda and 33% water. If the 20 cottage scale units work for 25 days a month on 2 batches per day, their combined annual production will come to 300 tonnes, yielding a minimum net profit of Le480,000 per annum with a capital investment of only Le40,000 in the 20 units employing 60 persons. A detailed plan has been prepared for the Small Industry Division to help in establishing 125 cottage scale laundry soap units spread all over the country during the next 2 years for meeting the estimated shortfall in demand of laundry soap to the extent of 2,500 tonnes per year.

- 3.8. Design of a low cost Rural Workshop Shed for implementation of Growth Centre Programme in villages. The Shed is designed to accommodate 6 craftsmen with independent work place and also for common facilities.

The 4th Division of IDD has not yet been established.

D. APPROPRIATE TECHNOLOGY DEVELOPMENT

4. Appropriate Technology Development activity was initiated from the consideration that on one hand such activity could help the country in taking a start towards capital equipment (for small scale industry) manufacture, while on the other to provide an opportunity to the counterparts and extension officers in upgrading their capabilities in engineering design and manufacturing.

- 4.1. Design, fabrication drawings and material cutting layout (to ensure avoidance of waste of imported materials) for laundry soap making equipment, in 3 capacities i.e., 25 kg, 60 kg, and 90 kg per batch.

- 4.2. Design, fabrication drawings and material cutting layout of efficient wood/charcoal fired furnace for application in soap, cassava garri and palm oil extraction, community kitchens, small-scale grain and salt drying. Already being manufactured.
- 4.3. Design of a more efficient palm oil extraction and clarification equipment. Fabrication of prototype is scheduled for 1985.
- 4.4. Design and construction drawings of a 135/144 cu. ft./day Biogas Family Unit based on utilization of cattle and vegetable waste. The first unit is scheduled for construction in 1985. The design is an improvement of Chinese and Indian design in the sense that it takes care of preventing dilution during the rainy season, ease in agitation of slurry in the digester, thorough and easy mixing of the charge, and in maintaining uniform gas pressure.
- 4.5. Empirical formulas and guidelines for design and fabrication of (i) Screw Conveyer, and (ii) Centrifugal Blowers for application in small industrial plants and in food grain drying, cassava garri, soap making etc.

In evolving the above designs, the following factors have been taken care of:-

- i) Low cost of production;
- ii) Least wastage of imported raw material;
- iii) Least use of imported components;
- iv) Minimum machining;
- v) Simplicity of construction, to enable metal workers in the Provinces to fabricate;
- vi) Ease in transportation;
- vii) Simple to erect;
- viii) Simple to operate;
- ix) Simple to maintain; and
- x) Safety.

E. COUNTERPART TRAINING

The following Officers of IDD worked with the Expert from time to time as his counterparts:-

- | | | |
|------|------------------|---|
| i) | Mr. A. A. Ahmed | Economist Ag. Dy Director,
Planning Division. |
| ii) | Mr. M. A. Tunis | Small Industry Ag. Dy Director
Small Industry Division. |
| iii) | Mr. S.S. Kamara | Mechanical/Mining Engineer,
Dy. Director, Operations Division. |
| iv) | Mr. F.O.B. Walan | Management SIDO, S-Industry
Division. |
| v) | Dr. L.F. Elliot | Mechanical Engineer, UNIDO
Local Consultant. |

Every effort was taken to associate the available counterparts in all work done by the Expert. They were explained every detail involved through on the job demonstration, shown all possible alternatives to select from, think out pros and cons and then justify their choice with reasons. They were encouraged to question the Expert's opinion till they are convinced. They were asked to do similar jobs independently to help build up their own professional capabilities and for gaining confidence.

However, it is sad to note that more than the counterparts, one Designer/Production Engineer from the National Workshop, three Graduate Engineers from the University of Sierra Leone (one Ethiopian, one Kenyan and one Sierra Leonean) and two educated metal workers have benefitted from the Expert through frequent visits for guidance in industrial planning industrial management, maintenance, design and manufacturing technology.

During factory visits and tours of Provinces, the factory management, technicians and craftsmen were also provided guidance and assistance in solving their problems.

F. ADDITIONAL DUTIES PERFORMED

1. Maintenance of Imprest Account for CTA
2. Control of Project Vehicles Movement
3. CTA's functions during his absence from duty station on home leave (July 27 1984-October 16, 1984).

II. PROBLEMS FACED

1. Non availability of technical reference books and standards specifications is a serious deficiency in Sierra Leone, the Project and IDD. The Expert managed as far as possible and had to be content with the very old reference material of his own.
2. Lack of drafting equipment, tools and measuring instruments essentially required for helping industries (especially small and medium) in repair, maintenance, installation and training. Such tools and instruments are neither available with industrial units nor in the local market. This is a serious handicap for the Experts in performing their functions efficiently and safely. However, wherever possible the Expert had to manage by improvisation at the risk of personal injury, but such risk cannot be taken with others.
3. Insufficient natural lighting, frequent and extended electricity supply failures in the IDD offices are contributing to at least 30% of working time loss.

III. CONCLUSIONS

The two UNDP/UNIDO projects undoubtedly have to a considerable extent succeeded in achieving most of the objectives:

- i) the Development of Industries Act 1983 was passed by the Parliament in September 1983, and has recently been put operational with retrospective effect from November 1983;
- ii) the Industrial Development Department has been officially established, to help the MTI in purposeful and rational planning, development and promotion of the industrial sector;
- iii) the Small-Scale Industry Growth Centre Programme has taken a start and is on the verge of gaining momentum;
- iv) training/demonstration/equipment and technology development activities have been revived at the Small-Scale Industry Centre in Freetown, after the Centre and its 50 employees had remained idle for over 10 years.
- v) direct support to sick industries was initiated and diagnostic studies conducted in quite few units and recommendation for remedial measures made; and
- vi) as a result of the efforts of the project and IDD staff, MTI has been able to attract financial and technical assistance from CFTC, EEC and the Islamic Development Bank, and also attracting investors and interest of other aid agencies.

Yet the objective intended to protect and help Sierra Leone's industrial economy in real terms, could not be achieved fully. This is due mainly to insufficient efforts in making the IDD functional and making it an effective instrument for the implementation of the Development of Industries Act 1983.

However, it is gratifying to note that the Permanent Secretary has shown interest and has started initiating necessary action in the right direction, which is a very encouraging and hopeful sign.

