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UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

SOLIDARITY MINISTERIAL MEETING FOR CO-OPERATION IN THE INDUSTRIAL DEVELOPMENT OF THE PEOPLE'S DEMOCRATIC REPUBLIC OF YEMEN

PROJECT PROFILES*

Aden, People's Democratic Republic of Yemen
7-11 December 1985

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CONTENTS

INTRODUCTION

The need to accelerate the industrial development of the developing countries has always been continuous pre-occupation of the developing countries themselves as well as of various international organizations. UNIDO continues to play a crucial role in the attainment of this objective.

The Buenos Aires Plan of Action for Promoting and Implementing Technical Co-operation among Developing Countries (TCDC), which was adopted at Buenos Aires, Argentina, on 12 September 1978, expressed the developing world's determination to achieve national and collective self-reliance.

UNIDO, in co-operation with AIDO (Arab Industrial Development Organization), ECWA (Economic Commission for Western Asia) and the People's Democratic Republic of Yemen (PDRY) has acted in the spirit and purpose of the Buenos Aires Plan of Action in organizing jointly the Solidarity Ministerial Meeting to be held at Aden from 7 to 11 December 1985. Each of the co-operating agencies has prepared project proposals, which are put together in this portfolio.

The main objectives of the meeting are to identify mechanisms of co-operation whereby the invited developing countries and organizations could facilitate the flow of technical and financial assistance and participate in the implementation of industrial projects within the framework of an action-oriented programme, for promoting industrial development in the People's Democratic Republic of Yemen.

The development strategy of PDRY in the field of industry is to improve the productivity of the industry and to increase the chances for export. This can be done by concentrating investment in existing schemes in order to improve productivity capacity. It will be noted that this policy has been adhered to in the project proposals submitted by the Government of PDRY. There is in the projects an emphasis on the existing industries, completion of unfinished projects and upgrading of the managerial and technical skills of the industrial staff as well as new projects. The project proposals specified, may not, however, include all possible means of co-operation for the industrial development of the PDRY. The participating countries and organizations will, therefore, have the opportunity during the meeting to present additional proposals based on PDRY needs and plans and in line with their industrial development policy. It is hoped that every participating country and organization will make a substantial contribution in the form most convenient.

PDRY Country Paper

The People's Democratic Republic of Yemen (PDRY) is situated in the South-West corner of the Arabian Peninsula. It lies between latitudes $12^{o}/40'$ and $19^{o}/00'$ North and between longitudes $30^{o}/00'$ and $43^{o}/00'$ East. The country has an elongated shape and extends about 1,100 km from east to west. The width varies, extending about 160 km near the capital Aden, to 300 km at the widest part in the central area. The land includes a long coastal stretch and a series of inland mountain ranges and plateaux with deep valleys and rocky terrain.

The climate of PDRY is tropical and predominantly dry, ranging from humid hot to mild cold. The humidity reaches very high values in the coastal areas. There are two seasons, hot and the temperate. The coastal region is hot and humid in summer when the temperature is around $37^{o}C$. In winter (November to March) the weather tends to be mild and the mean temperature is around $27.7^{o}C$. Rainfall occurs on the interior highlands mainly in summer. The average rainfall is about 300 mm in the western highlands and 200 mm in the eastern plateau. Rainfall is scarce in the coastal plain.

Administratively PDRY is divided into six governorates with a total land area of 336,869 sq km.

The total population of PDRY as per 1973 census was 1.59 million including about 57% rural and 10% nomade population. The average growth rate of population has been 2.6% per annum and on this basis the population for years 1980 and 1985 have been estimated at 1.9 and 2.164 million respectively.

It is anticipated that the population will reach 3.8 million by year 2000.

The total workforce, according to 1973 census was put at 338 thousand. Half of this number were employed in agriculture and fishery sector. But the percentage has been reduced to about 40% by 1980.

The PDRY achieved its independence in 1967 and established an economic set-up based on the socialist principles. The major economic sectors including banking, trading and shipping were nationalised in 1969 and the economic policies were framed which brought about a dominant role for Public Sector. The mixed sectors and the private sectors also continue to exist. The foreign trade is monopolised by the Government Corporations.

PDRY is a small country having limited natural and mineral resources. There is a shortage of water in the country and there are no commercial energy resources in the form of hydro-power or oil for development. These circumstances have hitherto hindered the growth of the industrial activity of the country. The existing industrial sector may be considered to be in the initial stages of development and comprises of petroleum refinery, fish canning, textiles and carpets, ready-made garments, hides and skins, aluminium and furniture, cigarettes and matches, boots and shoes, PVC sandals and slippers, tomato paste and soft drinks, etc.

With its long coastal stretch of about 1,200 km, fishery is considered one of the principle resource endurement of PDRY.

As a result of development programmes implemented by the Central Government after its independence, the Gross National Product, GNP at current prices, has increased from 167.3 million YD[1/] (US$ 483.5) in 1980 to 257.1 million YD (US$ 743) in 1984, at the rate of growth of 11.3 annually.

The per capita income for the same period has grown from 88.1 YD (US$ 255) to 122.4 YD (US$ 354) representing an annual rate of growth of 11.6%.

Although the contribution of manufacturing industry to GNP in real terms has increased during the periods 1980-1984, its relative importance has remained the same.

In the absence of an indigenous resource base for the local industry, the country has to depend on imports from outside. The import items are wheat, rice, sugar, tea, ghee and vegetable oil, milk and by-products, spices, tobacco, sesame, textiles, cement, petroleum, machinery, electrical appliances, industrial materials, trucks and buses, clothing and footwear. The total value of such imports has increased from 225.3 million YD in 1980 to 309.6 million YD in 1984, an annual growth rate of 8.3%.

While the country's imports are substantial, the total exports from the country are meagre and were of the order of 7.5 million YD for 1981. This has increased to 30 million YD in 1984. The major items of export are fish, coffee, hides and skins, petroleum products and salt. Out of these, the fresh fish and petroleum products together earn about 75% of the foreign exchange.

1/ Rate of exchange of US$ 1 = 0,345 YD.

The first development plan covering 3 year period was completed by 1974, and a 5-year plan by 1979 and is presently running in the 1981-85 plan. During the first two plans, high priority was given to the commodity producing sectors such as agriculture, fisheries and industry, to strengthening the transport and communications, and expand the services related to education and health.

The second five year plan (1981-85) aims at further development of the various aspects of the country's economy. The development objectives for the second five year plan may be summarized as follows:

- Expansion of capacity and use of better technology for the industries, particularly in the agricultural, fisheries and manufacturing sector.
- Establishment of new industries.
- Increasing the labour efficiency.
- Increasing the per capita income.
- Increasing the role of state co-operative sectors.
- Mobilisation of internal resources and increasing the export potentiality.
- Exploration and utilization of natural resources with emphasis on energy and mineral resources.
- Improving physical infrastructure facilities.
- Improving standards of education, health, housing and other social services.

The investment outlays proposed for the 1981-85 plan period for the Public Sector and the organized sectors including the joint sector, co-operative sector and the organized private sectors are shown in the table

The industrial sector was given an appreciable push since the early years of development. As indicated in the table, the allocated investment of manufacturing industries, oil, minerals, electricity, water in the SFYP (1981-85) amounted to 140.3 million YD representing 27.7% of the total. Actual investments in manufacturing, oil and minerals during the first two years of the SFYP (1981-1982) amounted to about 25.6 million YD, representing 10.6% of all investments expended during the period (242.5 million YD). The Manufacturing sector now constitutes about 8% of PDRY's GDP and provides 10% of employment.

PROPOSED INVESTMENT OUTLAYS FOR 1981-85 PLAN PERIOD

S. No.	Sector	Investment YD Million	Percentage of Total
1.	Industry (including manufacturing, mineral resources, electricity, water)	140.3	27.7
2.	Fisheries	33.2	6.5
3.	Agriculture	62.0	12.2
4.	Trade and supply	5.3	1.0
5.	Construction (roads and others)	48.9	9.6
6.	Transport and communications (including ports)	44.3	8.7
7.	Housing and associated facilities	86.3	17.0
8.	Education	22.6	4.4
9.	Health	15.0	2.9
10.	Others	50.9	10.0
	Total	508.8	100.0

Although the Third Five Year Plan (TFYP) 1986-1990 is still being prepared and revised, at the time of preparation of this document, some kinds of industrial development could be indicated.

Investments for the manufacturing sector during the coming plan period is high in comparison with previous plans, amounting to about 58.55 million YD as compared to less than 40 million YD during the SFYP.

It is worth noting that out of the total investments allocated, about 33.44 million YD are for developing and improving some on-going firms through additional equipment, new lines of production, training, changing the layouts, diversifying the product mis, etc., with the purpose of raising efficiency.

Production of manufacturing sector is planned to increase by 72.2 million YD by the end of the plan period 1990 over the estimated value of 35.2 million YD in 1985, which represents an average annual growth rate of 15.26%.

An increase of 9.3 million YD of value added by the end of the TFYP period is planned from 12.1 million YD in 1985 to about 21.4 million YD in 1990 which represents an average annual rate of increase of 15.2%.

Employment of manufacturing sector is planned to reach 7,426 workers in 1990 as compared to 6,037 workers in 1985, thus creating 1,389 new employment opportunities.

Productivity (value of gross production per worker) is planned to increase through the period of TFYP, to reach 9,717 YD which exceeds productivity in the year 1985 (5,902 YD) by 3,815 YD, at an overall rate of increase of 65% over the period.

PDRY as a least developed country shares with other LDC some of their economic handicaps. Therefore the major constraints to development in PDRY may be summarized as follows:

- Acute shortage of skilled workers, technicians and industrial managers.
- Poor endowment of natural resources for supporting resource based manufacturing.
- Lack of financial resources.
- Energy constraints.
- Small size of the domestic markets.
- Weak infrastructure.
- Scarcity of water resources.

In view of above constraints, the need of PDRY, for implementing the present and future plans would be in the following fields:

(a) Need for external assistance: This is the main disabilities which will remain throughout the 1980's and perhaps beyond. Consequently, the country hopes that it will receive external assistance in the following fields:

- Financial support: Since the country depends on foreign corporations and contractors to implement its development projects, the cost of these projects assumes a different dimension.
- Technical and commodity support:
  - Technological support: To enhance the transfer of modern technology and the development of indigenous technology.

- Development of the administrative organs: To develop planning and administration and to support existing institutions to build and develop government institutions. This will contribute to an increase in the absorptive capacity of the administration and the economy.

(b) Need for training of skilled manpower: There is a growing need to accelerate the establishment of educational and technical training institution to compensate for the high rate of emigration of skilled manpower.

(c) General budget unable to finance local and recurrent costs: The country will require financial assistance to finance local and recurrent costs as they cannot be financed from the general budget.

The Third Five Year Plan, 1986-1990 has emphasized on productive activities. The investment in the manufacturing industry sector is a substantial one.

In order to implement the plan in time and due to the need of PDRY as indicated earlier, assistance is sought to implement a number of projects.

The project proposals submitted to the participating countries covering priority areas indicated in the five year plan 1986-1990 have been prepared in close consultation between organizing agencies, UNIDO, AIDO, ECWA and the authorities concerned in PDRY.

The proposed projects can be classified into following categories:

(a) Projects aiming at modernization, expansion, development, reforming some of the on-going firms belonging to the public sector or co-operatives.

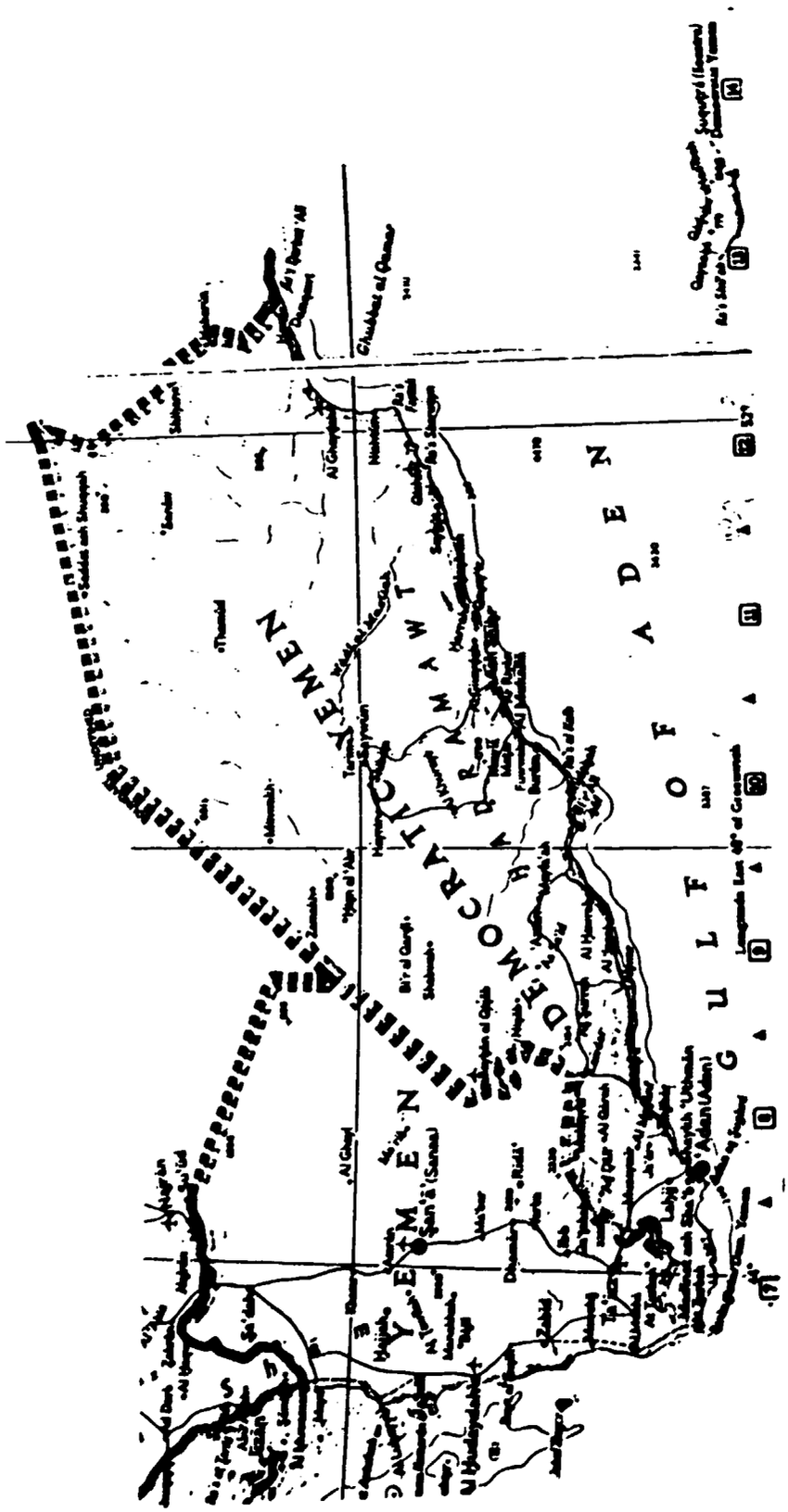
(b) Projects to undertake feasibility or opportunity studies for new investment ideas for the production of a variety of consumer goods, intermediate and capital goods and identified by examining various statistics data related to resource availabilities, inter-industrial and inter-sectoral relations.

(c) Projects for reorganizing departments of the Ministry of Industry in PDRY and upgrading the staff, training local manpower to be prepared for newly approved projects. Most of the projects of the first category contain also the element of training to upgrade the technical and administrative staff.

(d) Miscellaneous projects for specified sectoral studies to serve future planning of the industrial sector.

The proposed projects reflect in fact the national overall strong tendency to build up a modern industrial sector within the defined plan targets, mainly for more self reliance and provision of some basic needs of the population and falls into the category of building up capabilities, setting up import substitutes and utilizing the local raw materials industries. Also they clearly indicate a conscious and frank determination to overcome difficulties and correct weaknesses of some previous/on-going firms and to attain efficiency. It seems more likely from examining the proposed projects, together with other planned projects that the industrial sector is moving to a new phase of development.

Technical and financial assistance is called for to help fulfill the previously described aims. All the proposals are strongly justified and it is hoped to attain required assistance. It is known that the PDRY financial resources are limited and this indeed is reason enough for the country asking assistance from sister developing and Arab countries. The PDRY presents an appropriate and fertile ground for ECDC/TCDC. This would demonstrate to the rest of the world the political will of the Third World to launch a practical and realistic programme of co-operation between themselves and such co-operation to be conducted in the spirit of collective self-reliance.


YEMEN
GULF OF ADEN

PROJECT No.	PROJECT TITLE
1.	Assistance to Agricultural Implements Factory (AIF).
2.	Assistance to Revolution Metal Industries REVOMETAL.
3.	Assistance to Costal Carpentary Co-operative in Mukalla.
4.	Installation of Machinery at the National Tanning Factory, Sheikh Othman, Aden.
5.	Assistance to Al-Gundi Plastic Factory, aiming at the future establishment of a Plastic Processing and Application Centre (PPAC) Aden, PDRY.
6.	Technical Assistance to State Enterprise of Carpentary.
7.	Assistance in conducting a full-fledged Feasibility Study for Establishing an Industrial Free Zone in Aden.
8.	Preparation of a Feasibility study to establish Tomato Triple Concentrate 30 - 40%.
9.	The provision of Technical Assistance related to training of National Staff in the Operation and maintenance of the New Cement Factory.
10.	Preparation of a feasibility study to establish a unit for the production of Butaga Cylinders.
11.	Technical Assistance to the "Study Department" Ministry of Industry.
12.	Technical Aid to the three sections of The Study Department - Ministry of Industry.
13.	Technical Aid to Industrial Documentation Centre.
14.	Survey of the Industrial Sector to identify Areas for Private Sector Activity and Incentives Recommended.
15.	Technical Assistance for Clothing Industry (Apparel Production)
16.	Assistance to Leather Industry.
17.	Assistance to the Industrial Projects Department, (IPD) Ministry of Industry.
18.	Sectoral study of the Clothing Industry (Apparel Manufacture).
19.	A study on Packing Materials.
20.	Establishment of Industrial Areas in People's Democratic Republic of Yemen.

Project No. (cont'd)	PROJECT TITLE (cont'd)
21.	Opportunity Studies for Some New Project Ideas.
22.	A Comprehensive Study on the Production of Building Materials.
23.	Rehabilitation and Modernization of Al-Mansoora Textile Mill.
24.	Gypsum Panels Plant in PDRY.
25.	Dry Cell Battery Plant.
26.	Biscuits and Sweets Plant.
27.	Edible Oil Industry.
28.	Vocational Training Centre.
29.	Soap and Detergent Complex.
30.	Accumulator Battery Plant.
31.	Preliminary Technical and Economical Feasibility Study for the Development of Fibre-glass Fishing Boat Workshop
32.	Preliminary Feasibility Study for a Fish-canning Plant Project.
33.	Preliminary Feasibility Study for a Project to build a complex for the manufacturing of Hygienic Tissues and Paper.
34.	Preliminary Feasibility Study for a project to manufacture corrugated cartons.
35.	Technical and Economic Feasibility Study on a project for the production of shaving-cream and toothpaste.

Project Title: Assistance to Agricultural Impliments Factory (AIF). A 3-Phase Programme.

Project No. 1

Background Information

The Agricultural Impliments Factory was established with an installed capacity of 1200 thousand pieces of different impliments (digger holes 300,000 - hand hoe 300,000 - hoe/spades 100,000 - sickle 300,000 - scissors 200,000 - knife 300) on one shift basis, in addition to a wire drawing and netting unit.

The amount produced in the first two and a half years (mid 1976 to December 1978) exceeded the market demand, although actual production in 1978 was far below the installed capacity. From January 1979 production of agricultural impliments was stopped. Since then a number of examinations and analyses were undertaken, for the rehabilitation of the Agricultural Impliments Factory, by several UNIDO experts, including a report on economic evaluation, production cost analysis and market study and a report on the factory itself.

In April 1983, a technical advisory mission by the UNIDO was undertaken, aimed at advising and assisting the Government of PDRY in elaborating a programme on the rehabilitation and start-up, production diversification of the Agricultural Impliments Factory and the establishment of a National Common Engineering Services with a practical programme of self-reliance and local technical human power development capable of assisting local industries.

Several discussions were conducted with the Ministry of Industry, UNDP/ UNIDO field experts, Agricultural Impliments Factory, Spare Parts Revolution Factory, The National Aluminium Industry Co., staff of the College of Technology, University of Aden, and as a result the 3-phase approach - proposed by Mr. Swamy Rao , UNIDO Expert, and recommended by UNIDO Senior Advisor on Engineering Industries, implying:- a) immediate rehabilitation and start up; b) product diversifcation; and c) the establishment of Common Engineering Services at the Agricultural Impliments Factory was accepted by PDRY high officials.

The 3-phase programme was planned to be executed within 5 years (January 1984 to December 1988) with a total cost of 1,529 US$, in addition to inputs in kind (buildings and other facilities) provided by the Government. Project proposals for the three phases of this integrated 3-phase programme will follow under the titles:-

a) Engineering Assistance to Rehabilitate/start up of Agricultural Impliments Factory (AIF), Aden;

b) Assistance to Product Diversification and Training in Production Technology (AIF), Aden;

c) Establiishment of Common Engineering Services at the AIF, Aden, to serve the Industrial Sector.

For time-phasing and components of assistance required refer to Appendix I.

Project Title: Engineering Assistance and Rehabilitation/Start-up of Agricultural Impliments Factory, Aden.

Project No. 1 (A)

Project Description

I. Information on the Project

Information about the Project and Justification

The project is the first phase of the 3-phased programme to rehabilitate and start-up a modest production programme of improved agricultural tools and other items, utilizing existing production machinery, but developing new ideas, fixtures and production processes and training local personnel. Duration was planned to be 12 months starting from January 1984.

Project Input Requirements (technical assistance)

Subcontract no. 1 - Agricultural tools/digger/hoe/sickle etc.

- 2 experts (production engineer and tools/die engineer for one week (total 0.5 m/m to carryout a diagnostic analysis); 15,000 US$
- Jigs/tools/die etc. supply (design and manufacture at home office 2 sets each) and supply of process planning, production technology and utilization of machine tools information for each of 3 improved products; 100,000 US$
- Costs of the return visit of the 2 engineers for 4 weeks to start up production of improved products on a modest scale and train local personnel (2 m/m); 25,000 US$

Total : 140,000 US$

Subcontract no. 2 - Electroplated items - knives, scissors

- One production engineer to carryout a diagnostic analysis (1 m/m); 10,000 US$
- Supply of new jigs, fixtures and production technology for manufacture of improved products; 50,000 US$

- Return visit of production engineer for 1 month for assisting start up production of improved products; 10,000 US$
- Technical staff mission 2 times for 1 week; 8,000 US$
- Miscellaneous. 17,000 US$

Total: 85,000 US$

Grand Total: 235,000 US$

Total Project Costs: 235,000 US$.

II. Objectives of the Project

A) Development Objectives

To assist the Government of PDRY in promoting measures with a multiplier effect on rehabilitation of mechanical engineering industries (through a pilot programme).

B) Immediate Objectives

Rehabilitation and start up, product diversification of the Agricultural Impliments Factory, with trained local manpower to carry on.

III. Outputs expected and subsequent activities required

A) Outputs

A report containing the results of the activities stated below, 2 sets of dies, jigs, fixtures prepared by experts at their home office (necessary to produce improved products on the same production machinery system).

B) Activities

- Preparation of correct engineering specification by AIF's engineers for the improvements necessary on items that were previously produced (digger hoe, hoe, sickle, knife, scissors) and preparation of engineering drawings.

- Establishment of an AIF marketing set up by the Government with emphasis on rural marketing infrastructure, credit and protection for locally produced products.

- Diagnostic analysis by the experts under the two subcontracts - one for forged agricultural tools and the other for electroplated items in the

products that were produced and improvement suggested, advice on raw material requirements and production technology.

- The subcontractors to prepare 2 sets of dies, jigs, fixtures (at their home office) necessary to produce improved products on the same production machinery system.

- Return visit of subcontractors to Aden with jigs, fixtures etc. after improved/necessary raw material is provided by the Government, and subcontractors assisting the local team to start up AIF and produce a small number of each improved item, train local personnel and advise on strengthening AIF organizational set-up.

- AIF to conduct a short end user study and produce further small number of the same improved products.

IV. Assistance Sought

Technical Assistance

Two subcontracts to analyse production machinery utilization, study the improved design and specification of products (which were manufactured formerly 1976-1978). Prepare jigs, fixtures etc, start up production of improved products and train local personnel in production technology. Total costs: 235,000 US$ as specified under Project Input Requirements.

V. Inputs from the Government

- Specify exactly necessary improvements of each item of the products.
- Allocate national engineers.
- Procure all raw materials and bear other costs necessary for initial batch level production.
- Establish a National Marketing Mechanism.

Project Title: Assistance to Product Diversification and Training in Production at Agricultural Impliments Factory (AIF) Project No. 1 (B)

Project Description

I. Information on the Project

Background Information

The project is the second phase of rehabilitation and product diversification of the 3-phase programme, duration 24 months, aimed at expending the products to be manufactured by AIF and start commercial prototype fabrication and low volume batch level production.

Project Input Requirements (technical assistance)

Mechanical/production Engineer (for demand analysis and product specification)	12 m/m	90,000 US$
Design Engineer	6 m/m	45,000 US$
Design Engineer	6 m/m	45,000 US$
Marketing Expert	6 m/m	45,000 US$
Mission Costs		5,000 US$
Staff Travel		5,000 US$
Study Tour		10,000 US$
Training		15,000 US$
Prototype samples		25,500 US$
Other marginal production machinery		100,000 US$
Miscellaneous		5,000 US$

In addition to the above, inputs from the Government are:-

- a team of Engineers
- production workers
- raw materials and working capital.

Total Project Costs: 390,500 US$ plus inputs in kind provided by the Government.

II. Objectives of the Project

A) Development Objectives

To assist the Government of PDRY in promoting measures on product

diversification of metal mechanical engineering industry, through a pilot programme.

B) Immediate Objectives

To expand products to be manufactured at AIF and start commercial prototype fabrication and low volume batch level production.

III. Outputs expected and subsequent activities required

A) Outputs

A list (and catalogue) specifying economically viable products to be manufactured at AIF. Pilot demonstrations to AIF to enhance its capability to manufacture a limited number of economically viable mechanical and metal products. Prototype equipment installed and tested.

B) Activities

- Providing the services of a mechanical engineer to be attached to AIF to work in co-operation with UN field experts of UNDP projects.
- Conducting a nation-wide market analysis on engineering products to detect those which have a demand and could be manufactured at AIF, and work out detailed product specifications, collect samples, prepare the basic drawings and prepare a technical catalogue of 8-10 economically viable products.
- Sending 2 technical personnel on a study tour to 1 or 2 developing countries for 1.5 months (3.0 m/m) to identify and select appropriate mechanical engineering products that could be manufactured at AIF.
- To supply prototypes of selected equipment (mechanical engineering products referred to above) to AIF.
- To provide necessary expertise in the area of production technology, industrial engineering, machine tools and equipment utilization and tool engineering quality control in metal machines.
- Organize marginal equipment, spare parts and tooling.
- Necessary Government support in foreign exchange allocation and budgetary measures to render expert assistance at factory level.

For projects that may be considered for product diversification, refer to Appendix 2.

IV. Assistance Sought

A) Machinery and Equipment

Marginal productive machinery (cost: 100,000 US$)

B) Technical Assistance

- Provision and/or financing an appropriate mechanical engineer.
- Provision of financing of experts in engineering design and prototype production and marketing expert.
- Organizing study tours for 3 of AIF and Ministry of Industry personnel for training abroad, and for 2 technical personnel to 1 or 2 developing countries
- Supply prototypes from abroad
- Train local personnel as specified under Project Input Requirements.

Total Project Cost: 390,500 US$

V. Inputs from the Government

- Provide a team of national engineers and production workers.
- Provide raw materials and the working capital needed.

Project Title: Establishment of Common Engineering Services at AIF, Aden, to serve Industrial Sector.

Project No. 1 (C)

Project Description

This project constitutes the third phase of the AIF rehabilitation and product diversification 3-phased programme, aiming at the establishment of Common Engineering Service Unit, to serve AIF directly and provide (mechanical industrial) engineering services to Yemen Industrial Sector in the following areas:-

- technical consultancy services in general, including tool engineering and engineering design;
- prototype fabrication (as a bridge between engineering applied, research and development, and commercial manufacture);
- technical training (shop-floor production level training in all aspects).

The common engineering unit will act as a centre for the development and promotion of technological and engineering capabilities to meet the requirements of various industries for mechanical/engineering services. While the Revolution Workshop (REVOMETAL) will become the centre of Yemen Metallurgical Industries.

The establishment of the Yemeni Common Engineering Services is planned to be executed within three years, beginning by the end of phase 2, costing 904,000 US$ (not including the buildings which will be provided by the Government).

The contribution of the College of Technology, University of Aden, will be called for, forming a step for linking the University with the Industrial Sector, where the senior staff will participate in solving current problems. A practical programme of action in this concern will be set up through joint consultations and exchange of ideas between the University and the Ministry of Indsutry.

I. Project Input Requirements

Expert: Mechanical Engineer	18 m/m	135,000 US$
Expert: Design Engineer	18 m/m	135,000 US$
Expert: Tool Engineer	18 m/m	135,000 US$
12 months in 3 split missions	12 m/m	90,000 US$
Mission Cost		7,000 US$
Staff Travel Cost		3,000 US$
Study tour	9 m/m	25,000 US$
Training	20 m/m	44,000 US$
Equipment		320,000 US$
Miscellaneous		10,000 US$
Total Project Cost (not including cost of building provided by the Government)		904,000 US$

II. Objectives of the Project

A) Development Objectives

To assist the Government of PDRY in strengthening engineering institutional capability and accelerate the process of self-reliance in development, technological information dissimulation and technical services to industry with specialization in selected engineering subsectors.

B) Immediate Objectives

Establishing necessary additional facilities at AIF to become the central point for all national common engineering services in the country.

III. Outputs expected and subsequent activities required

A) Outputs

An Engineering Service Unit, staffed with well-trained local experts and skilled technicians comprising:-

- equipped tool room capable of handling grinding of small simple tools, grinding and lapping of milling cutters, including high speed and carbidge tipped tools, sharpening of broaches and grinding of gear cutters (fit for the manufacture of

jigs, fixtures and tools for production facilities, training of skilled tool makers, maintenance of all special purpose tools, manufacture of spare parts.

- Heat treatment shop provided with equipment and heat treatment facilities fit for normalizing and annealing, case hardening, carburizing hardening and tempering, induction hardening, cyanide and neutral-salt hardening and tempering.
- Prototype production workshop.
- Engineering design and development office with necessary equipments.
- Technical advisory services office with simple instrumentation and laboratory facilities.
- Training wing with training visual aids.
- Library and Technical Documentation Centre.

B) Activities

- Defining, designing and installing necessary buildings.
- Specifying and procuring necessary equipment needed for the tool room and heat treatment shop and prototype production workshop in the sundry.
- Taking necessary measures for the staff travel. Selecting the appropriate countries and settle necessary agreements. Nominating the appropriate local technical personnel to be sent abroad, and undertake necessary measures for their departure.
- Taking measures for the fellowships of individual training of 10 personnel in 10 specific areas of mechanical and tool engineering for 2 months each. (selecting and specifying the areas, selecting the nominees, undertaking other necessary measures)
- Installation of the equipment in the tool room and heat treatment shop, workshop and preparing/equipping other facilities (training wing, engineering design office, laboratory, library etc.).

IV. Assistance Sought

A) Machinery, Equipment etc.

- Providing (and financing) the equipment needed (320,000 US$).

B) Technical Assistance

- Defining and specifying the equipment needed.
- Provision of appropriate experts and financing their expenses.
- Arranging for the study tours and training fellowships, as specified under Project Input Requirements.

V. Inputs from the Government

- To provide the building and local staff.
- To provide working capital.
- To provide administrative and legislative support.

Total project cost US$ 904.000.

APPENDIX I

Components of Required Inputs in 1000 US$

	Technical Assistance	Machinery Equipment	Total
A. First Phase	235	-	235
B. Second Phase	290.5	100	390.5
C. Third Phase	584	320	904
Total	1,109.5	420	1,529.5

APPENDIX 2

Products that may be considered for Product Diversification at AIF

1. The UNIDO previous expert missions and the Government's authorities have identified the following products (Table 2) on a preliminary basis for product diversification at the AIF, Aden.

Table 2

Government Proposal: Product List for Product Diversification at the AIF

Item	Annual proposed production qty. pcs.	Item	Carpentry tools pcs.
Shovels	5,000	Hinges	500,000
Adze	10,000	Window Locker	200,000
Spades, square nose	5,000	Hand Raup	5,000
		Handles	20,000
Spades, round nose	6,000	Hooks	5,000
Sickles	10,000	Stainless steel sq.	1,000
Axe	5,000	Files	5,000
Steel Picks	4,000	Hacksaw	500
Plough	2,000	Plans	500
		Adze	500
		Farmer Chisel	500
		Vices	500
		Nippers	500
		Drill	100

Item	Household pcs.	Item	Miscellaneous
Scissors	4,000	Chisel	2,000
Knives	6,000	Screw Driver	2,000
Forkes and spoons	20,000	Claw Hammer	2,000
		Hammer Wt. 21b + 15 1b	2,000

Item	Household pcs.	Item	Miscellaneous
		Scrapers	1,000
		Inside and outside wall corner plastering trow	1,000
		Spanners	1,000
		Bolts and nuts	10,000
		Leave springs for automobile	-
		Steel shelf	200

Item	Aluminium Products pcs.
Beds	12,000
Chairs	12,000
Tables	12,000
Doors and Windows	10,000
Stairs	2,000
Cupboards	12,000
Water Pipes Fittings	200,000

2. In this context the UNIDO Marketing Expert (project SI/PDY/82/801, attached to the AIF July/August 1982; 1.5 m/m) has recommended the following also (ref. Terminal Report of Mr. B.K.S. Jain and the Iterim Report of Mr. M. Sayeed, 18 August 1982, Section IV: selecting the product mis page 27):

(i) Leather Industry spare parts: NIL

(ii) Domestic Utensils: to be taken up only at the National Aluminium Factory.

(iii) Constructior Industry: Trowels, carpenter tools like planers, chisels, ghamelas (500-1,000 pieces each year); quantity may be too small.

(iv) Fire Extinguishers: not recommended

(v) Hand Tools for Engineering Industry: hammers, screw drivers, planners, etc., 1,000-2,000 of each item per year: volume too small for tooling up.

(vi) Structural Fabrication: recommended to be taken up by the Revolution Factory.

(vii) Tractor Implements (units/year): tillers: 250; M3 plow 2F 12": 150; disc plow 2F 26": 100; levelling blade: 50; agricultural front end loader: 75; trailers-tipping 4T, 2-wheel: 200; seeding attachment for tiller: 70. Recommended that AIF or Revolution Workshop take up production.

(viii) Concrete Mixer (unit/year): size 5/7: 40; 10/7: 20 and 14/10: 30.

(ix) Spare Parts for National Dock Yard Company: unlikely.

(x) Crown Corks: not recommended.

(xi) Hand Tools for Fisheries: hooks, knives, scalers: too small demand; not recommended.

(xii) LPC Cylinder: separate unit may be investigated (5,000 units/year). AIF facilities may be used also, but this will require in-depth study.

(xiii) Textile Machinery Spares: Retaining rollers, guide rollers, crank shafts, camshafts and other shafts, cams, pins and bushes, bolts, studs with guide wheels, pulleys, sprocket wheels, brackets, picker spindles, cadles, rails, tred balls, levers shuttle trays. No detailed analysis has been done on specification, demand, feasibility and possible utilization of AIF production facilities.

(xiv) Automobile Parts: Leaf springs, exhaust pipes, shackles pins, king pins, bushes, fuel tanks. No detailed analysis has been done. Please refer to item xii.

(xv) Other Pressed/Sheet Metal Parts: helmets, jerry cans, etc.

(xvi) Domestic Cutlery: improved variety of scissors, knives, also spoons and forks.

(xvii) Agricultural Hand Tools and Spares: hoes, sickles, shovels, pick axe, adzes, bar point for M.B. plow, sweeps, spare parts.

3. It is the opinion of the Senior Interregional Adviser that the above items may be considered as a preliminary guide only. But an in-depth analysis of national requirements, demand, techno-economic aspects and lastly which products (a small number of items) could be economically manufactured at AIF with due consideration to the existing production machinery and facilities that are remaining idle nov.

4. This will require - in addition - engineering specification, design, production technology, training (and in case of selected products, technology transfer/investment promotion). These aspects will have to be analysed.

5. It is recommended that any product diversification programme is taken up on a cautious basis with a limited number of economically viable products only.

Project Title: Assistance to Revolution Metal Industries REVOMETAL

Project No. 2

Project Description

I. Information on the Project

Background Information about the Project and Justification

The Revolution Metal Industries (formerly the Revolution Spare Parts Factory) is the biggest of 4 foundries in PDRY, and at present the only metal work enterprise operating at industrial scale in the country.

It is a sort of complex composed of a machine shop, a forge shop and a foundry for grey iron and some non-ferrous castings. Its main function is to produce replacement parts for local machinery and equipment on a jobbing basis, for the public sector and government establishments.

Two UNIDO experts were sent to study the conditions, diagnose the case and propose recommendations to overcome the difficulties and develop the foundry. They observed that the general purpose metal preparation and fabrication equipment were underutilized and that the workshop needs substantial inputs of equipment and machinery to widen the range of castings, to meet the needs of the country, as well as equipment to produce steel furniture. Also they identified the workshop needs of expert inputs to improve the technical level of the operations and the quality of the castings.

The installation and commissioning of the foundry equipment have been delayed substantially due to financial and organizational difficulties, and the project objectives in this part have not been achieved so far.

Bilateral agreements have been reached with India for shop-floor level/ technical assistance, but still other assistance is considered essential to provide high-level expertise. As to sheet-metalwork processing part of the above mentioned project an appreciable success has been achieved. Presently six major product groups are manufactured among which are office and domestic furniture, cooking appliances material handling products, metal fastners and agricultural implements.

Additional technical and financial assistance supplementing the appreciable government contribution will lead to uphold the Yemen National Metallurgical Industrial Complex with specialization in technology and training, serving the whole industrial sector and other sectors, which form the ultimate broad objective.

The proposed project describes further actions and activities intended to be carried out, to fulfill the above objective.

Project Input Requirements

Government Inputs

	Value in US$
- Providing of counterparts to the metalworking part of the project (in kind)	840,000
- Assigning/providing counterparts to the foundry part of the project	335,000
- Civil construction - metalworking part of the project	750,000
- Civil construction - foundry part of the project	802,000
- Equipment for metalworking part (840,000 US$) and for the foundry part of the project 1,116,000)	1,956,000
Total	4,683,000

In addition, the Government will provide 30,000 YD (equivalent to about 87,000 US$) in cash, in Yemeni Dinars, to cover part of the local costs of subcontractors' experts.

Inputs Required

Experts:	US$
- Project co-ordinator, expert in small scale metal work industries for 27 months (total 27 m/m)	225,000
- Foundry experts of total 27 m/m (on strip mission basis)	227,000

US$

- expert in erection/commissioning/operation of foundry melting facilities
- expert in moulding equipment operations
- expert in pattern making and pattern design

- Subcontract shop level technicians experienced in various fields of foundry operations including furnace operations - moulding pattern handling - welding - finishing capable to participate in the commissioning of newly installed facilities and everyday operations (their main task will be to train local personnel on the job) (total 80 m/m) 240,000

Training Abroad

Fellowships:

- Two fellowships for 2 foundry formen, duration 4 months each (8 m/m)
- Two fellowships for modulers core makers, duration 4 months each (8 m/m).
- One fellowship for metal surface application and painting (6 m/m)
- One fellowship for mechanical maintenance engineer (4 m/m)
- One fellowship for a pattern maker for 4 months (4 m/m)
- One fellowship for sheet metal - furniture assembly (4 m/m)

Total : 30 m/m 75,000

Study Tours:

- One laboratory testing engineer
- One electrical maintenance engineer
- One foundry metal working engineer
- Two metal furniture engineers

Total : 4 study tours with 5 participants 25,000

Equipment:	US$
- Relevant training equipment facilities and testing laboratory apparatus to be purchased under UNIDO financing, to equip a training unit and a small laboratory for metallurgical and quality control	100,000
- Project travel (negotiations/arrangements for equipment, contracted services and training)	10,000
- Staff travel (3 backstopping missions over a period of 2.5 years)	8,000
- Sundries (technical documentation, translation into Arabic, of technical manuals and technological instructions.	12,000
Total :	922,000
Total project cost :	5,605,000

II. Objectives of the Project

A) Development Objectives

To assist in improving and strengthening the national economy in general and metal working industry in particular, by full utilization of the equipment and materials and improving the productivity and quality of the products, as well as upgrading of knowledge and skills of the above-mentioned staff.

B) Immediate Objectives

- To upgrade basic knowledge and practical skills of the national staff.
- To introduce new metal products of high quality, towards the satisfaction of demand for metal furniture both for domestic and office purposes and for machine spare parts.
- To introduce utilization of local iron and steel scrap for casting of semi-finished products and finished cast products.

III. Outputs Expected and Subsequent Activities Required

A) Outputs

- Trained counterpart staff, within metal working part of the project.
- Trained counterparts staff, within the foundry part of the project.
- Additional produced items (about 44 new items) of metal products. for office and domestic furniture and other metal products (metal working part).
- 210 tons of good castings per year, increasing to 330 tons (1988) and further (1994) to 1000 tons per year (the foundry part).
- A tool room for metalworking and machine shops.
- A training unit formed within the enterprise for introductory training for newcommers and an upgrading of other already working employees.

B) Activities

By the Government

- Assigning additional counterpart staff of different levels; 4 during 1985 and additional 55 during 1986, within the metal working part.
- Providing additional counterpart staff of different levels (additional 5 during 1984, additional 8 during 1985, additional 15 during 1986) within the foundry part.
- Construction of 4 new sheds/buildings and increasing the infrastructural facilities to provide space for training unit, within the metal working part.
- Construction of the furnace foundations and the sheds/buildings for the furnace shop, moulding/casting bays, pattern-making shop and the scrap yard.
- Provision of additional equipment (expandable and non-expandable), including vehicles, materials and handling facilities for metal work and foundry parts.

C) Inputs Required

- Providing a highly experienced international project co-ordinator (undertaking the overall technical and organizational guidance and co-

ordination of activities, and rendering advice to the metal working part.

- Providing high-level experts, in establishment and operation of small iron and steel shops.

- Provision of a team of 6-8 top shop - level technicians.

- Arranging for the training programmes, fellowships and study tours.

IV. Assistance Sought

A) Machinery, Equipment etc.

Providing and financing the costs of training equipment and laboratory facilities (100,000 US$).

B) Technical Assistance

Selection, provision and financing the costs of experts (452,000 US$), and providing of fellowships and study tours (100,000 US$) covering other expenses related to negotiations, staff travel and sundries (30,000 US$).

V. Inputs from the Government

- Provision of counterparts (costing 1,175,000 US$).

- Undertaking civil construction works (costing 1,550 US$).

- Procurement of equipment (costing 2,956,000 US$).

- Paying the equivalent of 87,000 US$ (in YD 30,000) in each to cover the part of the local costs of subcontractors.

- Nominate relevant personnel to be trained abroad for fellowships and study tours, and bear their salaries and fringe benefits during their training and study.

Government input	US$	4,770,000
Input required	US$	922,000
Total project cost	US$	5,692,000

Project Title: Assistance to Coastal Carpentry Co-operative in Mukalla — Project No. 3

Project Description

I. Information on the Project

Carpentry co-operative of the coastal strip in Mukalla comprises of four manufacturing units: one for boats and launches and the other 3 for doors and windows, roofs and house and office furniture. Also, two other units: one at Ghail Bawazeer and the other at Shihir are working under this co-operative, where common services for the six units (administration, accounts etc.) are centralized at Mukalla. They cater to the entire production of boats and launches ceased because of the lack of imported inputs.

As the existing units are illplanned and their product neither improves in quality nor expands in value, it is proposed to establish an integrated modern carpentry complex 25 kilometers away from Mukalla on the main highway. Land has already been acquired and buildings erected, and about 32 machines are proposed to be transferred from the existing units to the new site. Investments already committed amount to about 800,000 YD (equivalent to 2.33 million US$). A techno-economic study was carried out defining the future direction of carpentry manufacture in Mukalla and determining the extent of the new project.

Project Input Requirement	US$
- An expert in wood industries, specialized in design and model forming with extensive experience, for 12 m/m	100,000
- Engineer specialized in wood working industries for 6 m/m	50,000
- Other expenses	2,000
Total project cost :	152,000

II. Objectives of the Project

A) Development Objectives

- Modernization of the wood industry in shape and form, with the possibility of price reduction for some items.

- Raising the managerial capabilities of Yemeni nationals.

B) Immediate Objectives

- Providing standard and unified designs for the main components of different categories of wood products.

- Initiating/raising the capability of national experts in furniture and other wood products design.

- Solving managerial problems in carpentries and upgrading the national capability in industrial management of wood work firms.

III. Outputs Expected and Subsequent Activities Required

A) Outputs

A techno-economic report including:

- Market and plant capacity; based on expected demand for various products considering the impact of expected competetive products and recommending production programmes for the co-operative.

- Raw material requirements (in quantity and value), according to the proposed production programme.

- Determine how far does the acquired land and buildings satisfy the requirements of the project.

- Project engineering aspects, where the state of existing equipment will be determined and decided which are to be transferred and which need over-hauling, and which are to be disposed of. A list of necessary spare parts to be defined. Additional outdoor facilities are to be specified. Utilized production capacities of various production centres have to be defined.

- An organizational chart for the plant and assessment of the overhead costs.

- Manpower requirements (for administration and marketing in particular) proposing necessary training programmes (at the shop floor/or abroad).

- An implementation programme including scheduled dates for different operations (engineering, procurement of machinery and construction etc.).

- Needs for technical assistance during production to ensure efficiency.

- Assessment of the total investment costs, proposed sources of financing, production costs, measurement of commercial and national profitability and selecting national profitability suitable for the country, with special attention to assess distribution impacts.

B) Activities

- Collecting necessary data.
- Preparing a detailed and full investment proposal.
- Consulting throughout with national authorities and staff.

IV. Assistance Sought

Technical Assistance

Provision and/or financing the experts.

Total cost 18 m/m	:	US$ 180,000
Other relevant costs	:	US$ 2,000

V. Inputs from the Government

- Appointing national counterparts.
- Providing necessary data.
- Providing transport facilities to the sites.
- Holding necessary meetings and discussions.

The project has been terminated and the UNIDO expert (Mr. H. Brion) submitted his final report entitled "Consideration and Expansion of the Manufacturing and Marketing Operations of the Coastal Strip Carpentry Co-operatives in Mukalla" in April 1983, comprising his recommendations.

Project Title: Installation of Machinery at the National Tanning Factory, Sheikh Othman, Aden

Project No. 4

Project Description

I. Information about the Project

Background Information

The Government of PDRY planned to rehabilitate and modernize the National Tannery at Sheikh Othman, Aden. UNIDO assisted in the implementation of the project. The Government of Yugoslavia extended assistance and the project became operational in 1980. The machinery was purchased in 1980 and training of national personnel of PDRY in Yugoslavia was undertaken. A Job Description for a six-month assignment of an expert in installation and operation of tannery machinery was prepared. A UNIDO expert assisted in installation of the machinery and pointed out an important remark about the Wool Sheep Skins (of imported Australian live sheep) amounting to more than 10,000 pieces annually, which were stored in drysalted conditions (due to lack of dressing facilities in the tannery) and consequently a big part of the stock was of poor quality. He suggested to process sheek skins to fur lining of shoes and for the manufacture of car seat covers.

In response to this recommendation a techno-economic study entitled "The Viability of Processing Sheep Skins in PDRY" was carried out by 4 Yugoslavian experts in 1984. The study contained a description of the technological processes, the list of machinery and equipment required, the layout and estimation of investment costs, the list of chemicals needed, energy and water required (with the possibility of using sea water), man power requirements, estimation of production costs, annual production and estimated sales revenue, anticipated profits, and anticipated foreign exchange earnings. The report recommended the establishment of a fur skin factory (a new line of production) to avoid the great losses caused by the present process of salt drying. A decision can be taken according to the techno-economic report. In case of accepting the project, all aspects have to be examined in detail, especially prices, putting into consideration that some

buildings of the existing tannery and infrastructure facilities could be used. The report pointed out that the Technoloski Centre, Karlovac, Yugoslavia is willing to co-operate under a long-term contract for co-operation, including the transfer of technology (without separate charges of know-how). The study provides a good basis for decision-taking and further suppliments can be undertaken while establishing the project.

Products to be Manufactured

- 84,000 m^2 wool sheepskins per annum, of which 60,000 m^2 for seat covers and 24,000 m^2 for shoe linings.

Present and Future Markets

- The project is export-oriented.

Plant Capacity and Manufacturing Process

- Plant Capacity : treating 10,000 pieces of sheepskins, giving 7,000 m^2 furs per month, semi-prepared and fully processed.
- Dyeing is suggested to be carried out through co-operation with a European enterprise, for the know-how transfer and marketing, especially for the car seat covers to follow demand for new colours and sizes.
- Manufacturing Process : entails consecutive steps of soaking, chrome tanning and various finishings.

Plant Input Requirements

Current Inputs :

- Raw materials - 10,000 pieces of wool skin monthly (400 per day).
- Chemicals (salt, enzymes, acids, soda (anydros), tanning agents, bleaching agents, wetting agents, petrol, flat liquoring agents, finishing agents).
- Steam 700 kg/h (utilizing the steam boiler of the National Tanning Factory.
- Electricity 171 kw (daily consumption 778 kwh/day).
- Water: (60 litre/kg).
- Manpower 46 workers (including the Manager).
- Investment Costs : US$ 781,831 (details in Investment Costs below).

Supplimentary Studies :

- Chemical Engineer with long experience in the tanning industry for 3 months (3 m/m).
- Economist with high experience in market analysis and marketing (10 years) for 3 months, to work in co-operation with UNCTAD/ITC (3 m/m).
- Industrial Economist experienced in project evaluation (commercial economic and national profitability analysis) for 3 months (3 m/m).

Total : 9 m/m

Cost :	Experts	US$ 90,000
	Other costs reports etc.	US$ 2,000
	Total :	US$ 92,000

Training :

- A fellowship for 12 months to train the technical manager (12 m/m).
- Four awards to train 4 technicians and supervisors for 3 months (12 m/m).

Total : 24 m/m

Cost : US$ 52,800*

Total Project Costs

- Investment costs	US$	781,831
- Supplimentary studies		92,000
- Training		52,800
Total :	US$	926,631

* For details refer to Appendix (costs were originally estimated at US$ 12,000).

Investment Costs

Fixed Investments	Local Currency (Equiv. in US$)	Foreign Currency US$	Total US$
Land	-	-	-
Buildings	210,000	-	210,000
Machinery and Equipment**	-	491,831	491,831
Working Capital	-	-	-
Pre-operational Costs	80,000***	-	80,000
Provision for Contingencies	-	-	-
Total	290,000	491,831	781,831

Information on Profitability and Return on Investment

The study reveals the following:

annual profits amounting to US$ 99,017

annual net foreign exchange/net earnings US$ 18,240
(value of exports - value of imported inputs).

II. Objectives of the Project

A) Development Objectives

- Efficient utilization of available material otherwise spoiled.
- More economic utilization of already installed fixed assets.
- Positive effects on the balance of payments.

B) Immediate Objectives

Modernizing and expanding the skin tanning capacity of the National Tanning Factory (by installing a new line of production) and other measures and raising quality of the product in order to meet international standards.

** For the list of machines required, refer to Appendix I.

*** Foreign Currency element (for imported inputs) in working capital is neglected.

III. Outputs Expected and Subsequent Activities Required

A) Outputs

- A new line for producing 84,000 m^2 of wool-sheep furs per annum in Sheikh Osman Tannery.

- Trained technical manager, technicians and workers on the technologies involved.

- A more elaborate study for the following: market study and marketing to identify potential markets.

- Annual revenues and costs for the lifetime of the new line and commercial, economic and national profitability evaluations.

B) Activities

- Elaborating the already prepared techno-economic report, to study in detail external/export markets, elucidate annual costs and revenues, to check investment items and investment costs, elaborate on the engineering aspects, set up time schedule for implementation, and operation for the lifetime of the project, preparing more detailed financial statements and evaluate the profitability of the project.

- Using well known criteria for commercial, financial, economic and national profitability measurements.

- Choosing the most appropriate supplier, negotiating and contracting.

- Preparing the detailed designs of the required new buildings and carrying out construction work.

- Erecting the machines, carrying out product experiments then beginning regular production.

- Training the future operating labour (foremen and supervisors) through practical work and theoretical education (including microbiological processes, structure of raw skins, methods of preservation, dressing of raw fur skins, methods of preservation, dressing of raw fur skins dyeing and bleaching, finishing, specific mechanical operations, ecology and control of manufacturing processes) for 3 months abroad. The technical manager is

to attend theoretical education and practical training for one year. This has to take place simultaneously when buildings and machines are being installed.

IV. Assistance Sought

A) Machinery and Equipment etc.

Providing machines at soft credit facilities, or soft loans for financing the procurement and installation of machinery. (US$ 491,831)

B) Technical Assistance

Providing and/or financing the cost of 3 experts for supplimentary studies and related costs.

(US$ 92,000)

Provision and/or financing 9 awards for training the technical manager and technicians.

(US$ 52,900)

Total : US$ 636,731

V. Inputs from the Government

- Providing necessary data for supplimentary studies.
- Providing national counterparts to supplimentary study and machine installing experts.
- Nominating the technical manager, 2 foremen and 2 supervisors to be trained for their future jobs, and bearing their salaries during the training period.
- Financing the local component of investment costs. (US$ 290,000)

Total Project Cost : US$ 926,731

APPENDIX I

Training

The best possibility for training the operating labour would be in co-operation with the foreign partner. Technical manager, foreman and supervisors should be trained for their jobs through practical work and theoretical education based on their previous knowledge. Theoretical education should include the following subjects :-

1. Microbiological processes in fur manufacture
2. Structure of raw skins, specially furskins
3. Methods of preservation
4. Dressing of raw furskins
5. Dying and bleaching
6. Finishing
7. Mechanical operations in furskin processing
8. Ecology
9. Control of manufacturing processes

Education should be based on discussions, demonstrations, practical work in laboratories and experimental stations, as well as participating in manufacturing processes.

Labour work could be trained by instructors and skilled technical staff in the course of 3 months. Also it should be necessary that the person responsable for technology for a period of 1 year, and he should carry out the training as required.

APPENDIX 2

List of Machines Required

1. Paddles for soaking - M_{14}
2. Hair and wool washing machine
3. Hydraulic fleshing machine
4. Wet fur shearing machine
5. Paddles for dyeing - M_{05}
6. Centrifuge
7. Tunnel dryer
8. Sow dust drum
9. Sow dust removing drum
10. Softening machine "Breg"
11. Staking machine "Dravinja"
12. Staking machine "Selbeck"
13. Toggle Dryer "Ekonom"
14. Combing machine "Astrahan"
15. Fur shearing machine "Angora"
16. Buffing machine "Ideal"
17. Ironing machine "Merina"
18. Measuring machine "Prima"

Project Title: Assistance to Al-Gundi Plastic Factory aiming at the future establishment of a Plastic Processing and Application Centre (PPAC), Aden, PDRY

Project No. 5

Project Description

I. Information on the Project

Background Information about the Project and Justification

The publicly owned Al-Gundi Plastic Factory, established in 1972, is the biggest unit engaged in the production of plastic products in PDRY, controlled and operated by the Ministry of Industry. It is equipped with extruders, injection moulding machines, bag making extruders, extrusion blown films, welding and printing and auxilary equipment. The Factory faced some difficulties attributed to various internal and external causes, manpower, the lack of maintenance facilities, quality control, the absence of mould making machines, in addition to the shortage in skilled manpower and consequently the low performance and production efficiency. As the Government was determined to remove the obstacles facing production, raise the efficiency in general and improve the quality of products, in particular assistance was sought since the early seventies. A programme of technical assistance was undertaken by UNIDO during 1975 and 1976. An expert was recruited to give advice for solving problems that faced the production in the film extrusion and injection moulding sections, presented several recommendations, the most prominent of which were the necessity for establishing a quality control unit facilities for mould repair in addition to extensive training.

In 1984, UNIDO assisted the Government of PDRY in fielding experts in testing and quality control with a view to examening the situation and making recommendations in order to solve problems faced by this Factory and remove causes of inefficiency and advise and assist in setting up a quality control laboratory, improvement of the processing techniques, and recommend appropriate techniques for mould making and mould design. The experts presented their recommendations, the most important of which were the necessity of quality control laboratory and mould making and mould design, and the installation of a Plastic Producing and Application

Centre, Yemen in AGPF, to initiate and promote the application of plastic in some sectors (agriculture, water management, fishery etc.) to help meeting the most important requirements in the country. In addition, training was heavily recommended. In the same year the project was evaluated and the Government of PDRY approved the proposed recommendations and plan of action, which included training and study tours to some developing countries. Therefore, the present project was proposed to be executed within two years.

Government Contribution	US$
- Machinery equipment, blow moulding unit, including moulds and dies	250,000
- Woven bag unit, two injection moulding machines (including moulds)	350,000
Total	600,000
- In addition to expansion of material (working capital)	350,000
Total Government Contribution	950,000

Assistance Sought

Machinery and Equipment	US$
- Mould making basic equipment and suppliments	170,000
- Quality control basic equipment and suppliments	300,000
Total	470,000

Technical Assistance

- Study tours for management and senior staff 2 persons for one week and 1 for 4 weeks	15,000
Total Study Tours	15,000

	US$
- Fellowships:	
3 persons in mould making for 12 months (36 m/m)	79,200
2 persons in quality control for 6 months (12 m/m)	26,400
2 persons in administration and accounting 3 months each (6 m/m)	13,200
Total Fellowships	118,800
- Consultants:	
Expert in practical work of mould making and die making, with experience in maintenance and design and, preferably training experience (1 x 2m = 2 m/m)	20,000
Expert in practical work of injection moulding, blown film extrusion, weaving blow moulding, welding, printing, preferably with training experience (2 x 1m = 2 m/m)	20,000
Expert in test methods, sample preparation test operation and evaluation (1 x 2m = 2 m/m)	20,000
Expert in practical training assistance for vocational training and on-the-job-training (2 x 1m = 2 m/m)	20,000
Expert for plastics in agriculture (1 x 2m = 2 m/m)	20,000
Total Consultants	100,000
Total Assistance Sought	703,800
Government Contribution	950.000
Total Project Cost	1,653,800

	Foreign Currency Component (in US$)	Total (in US$)
- Fixed Investments:	Total in US$	
Land		
Building		
Machinery and Equipment	1,070,000	1,070,000
Working Capital	350,000*	350,000
Pre-operational expenses	233,800	233,800
Provisions for contingencies		
* Local component in working capital is neglected.		
Total	1,653,800	1,653,800

II. Objectives of the Project

A) Development Objectives

- Upgrading the performance of plastic industry and expanding of plastic processing industry to new applications in the industrial and other sectors (irrigation and water management and fishery), in addition to provision of advise and services in the fields of mould making, maintenance and quality control and testing, and thus supporting the industrial and other sectors.

- A wider range of consumer goods with possible cost and price reduction, leading to more satisfaction of the needs of the population and improving the standard of living.

B) Immediate Objectives

Upgrading the knowledge of AGPF staff in:

- adequate technique of mould design and mould making
- maintenance and rapair of machinery
- quality control and laboratory testing

- plastic processing (to improve the properties of products)
- products and raw materials properties (for proper selection of raw material)
- equipment
- administration and accountancy
- marketing and market studies
- supporting and expanding the existing facilities of AGPF in:
  - mould making
  - maintenance
  - quality control and testing
- creating a documentation and standardization centre at AGPF in the field of plastics technology

III. Outputs Expected and Subsequent Activities Required

A) Outputs

- A workshop for mould making, mould repair and maintenance.
- A laboratory for quality control and plastic products.
- One simple experimental station for the demonstration of application of plastics in agriculture and fishery.
- A documentation and standardization unit.
- A programme of local vocational training in maintenance, mould repair, quality control and plastics processing and design.
- Capability of AGPF staff raised in:
  - marketing and market studies
  - administration and ability to solve administrative problems
  - processing of plastics in AGPF
  - providing technical assistance to other sectors

B) Activities

- Selection and provision of experts.
- Provision of equipment, tools and materials for the workshop for mould design and making, mould repair and maintenance.

- Provision of equipment for the quality control laboratory.
- Selection and scheduling of appropriate activities for setting up an experimental station.
- Selection and scheduling of appropriate activities for documentation and standardization.
- Selection and provision of study tours for management and senior staff.
- Selection and provision of fellowships.
- Preparation of a list of local training proposals.
- Initiation of discussion group meetings involving international consultants and counterparts.

IV. Assistance Sought

A) Machinery and Equipment etc. (as shown under "Inputs" above)	US$ 470,000
B) Technical Assistance (study tours, fellowsips and consultants as specified in "Outputs" above)	US$ 233,800

V. Inputs from the Government

- Financing the procurement of some equipment (shown under "Inputs" above)	US$ 600,000
- Financing expansion of material	US$ 350,000
- Nominating of personnel for study tours and fellowships, bearing their salaries during their training abroad.	
- Providing appropriate counterparts.	

Project Title: Technical Assistance to the State Enterprise of Carpentary, Aden

Project No. 6

Project Description

I. Information on the Project

Background Information about the Project and Justification

The State Enterprise of Carpentary was established in the year 1973. The Government of PDRY, driving at developing and raising the efficiency of the wood industries, called for international technical aid.

A UNIDO expert, in 1979, carried out a thorough exemination of the situation of three factories (main factory for producing furniture in Maala, another in Cizerat Al-Ommal, and a third for ship building in Higeif) and made recommendations specifying means and measures needed for treating deficiences, including the quality of products, raising the design capacity, the productivity of labour, initiating an efficient quality control centre, undertaking structural changes in the layout of the factories, additional machinery and equipment needed for the production of doors and windows (a new activity then) and proposed plans to develop the factories in particular and wood industries in general in the short and long run. The proposed project aims at further technical assistance related to:

- furniture design, specifying recommendations to improve the local design capacity and to set up unified styles (patterns) for different wood work categories (different pieces of furniture, doors and windows), which is considered to be a means to raise the productivity;

- raising the efficiency of the management and creating competent nationals with high industrial management capabilities through managing time and cost minimization.

Project Input Requirements

- For model design: an expert in the wood industries, specialized in design and model forming with extensive experience, for 12 months (12 m/m);

- For industrial management: engineer specialized in wood working industries in similar firms, for 6 months with experience (6 m/m).

Total : 18 m/m

	US$
Cost	180,000
Other Related Costs	2,000
Total Project Costs	182,000

II. Objectives of the Project

A) Development Objectives

- Modernizing wood industries in shape and form with the possibility of price reductions for some items.

- Raising the managerial capabilities of nationals (Yemenis).

B) Immediate Objectives

- Providing standard and unified designs for the main components of different categories of wood products.

- Initiating/raising the capability of national experts in furniture and other wood products design.

- Solving managerial problems in carpentaries and upgrading the national capability in industrial management of woodwork firms.

III. Outputs Expected and Subsequent Actvities Required

For Model Design:

- a report comprising the selected designs for the main items of different categories of wood products, matching with modern developments, local taste and environmental conditions, specifying suitable material for each (natural wood, ply wood, particle wood etc.);

- training programmes and fellowships needed to upgrade national experts in wood work design.

Industrial Management:

- a report comprising clear recommendations about different measures and means needed for efficient operation of the firms, with rough estimations of investment costs needed for suggested additional assets or layout changes.

- recommendations for further requirements of training programmes (study tours or fellowhsips in the field of industrial management);

- a number of upgraded nationals in industrial management.

B) Activities

For Model Design:

- nominating the suitable experts and taking measures for their recruitment and fielding;

- studying various reports by UNIDO experts, specially the Terminal Report of project RP/PDRY/82;

- examining the present conditions concerning specifications, shape and quality of different items/components of the different categories of wood products;

- detecting/training the present national tastes and trends of future changes;

- selecting and adopting appropriate standard unified design(s) for different products and producing samples of small models (maquettes);

- defining different measures to initiate and develop national capability for design in detail;

- defining and specifying required training programmes (theoretical and practical) required numbers of trainees, duration, suitable universities and institutes.

For Industrial Management:

- nominating, recruiting and taking measures to field the expert;

- examining the present situation of the factories and detecting points of weaknesses after reviewing former expert's reports;

- recommending proper solutions for different aspects: material handling - the flow of operating steps - procurement of material inputs inventories - marketing of the output - requirements from different additional skills organizational structure etc., as well as examining the layout of the 3 firms commenting about their suitability, printing out clearly his recommendations in their concerns with rough cost estimations for proposed amendments.

- holding discussions with authorities of PDRY for exchange of views;

- training national employees to solve current managerial problems (on-the-job).

IV. Assistance Sought

Technical Assistance

Provision and/or financing the experts and bearing the related costs.

	US$
Project Cost	180,000
Other related costs	2,000
Total Project Cost	182,000

V. Inputs from the Government

- Providing suitable counterparts.
- Providing necessary data and information.
- Facilitating the production of proposed designs and "maquettes" (small models) in one of the factories, by providing necessary materials and other inputs.
- Holding discussions with experts whenever deemed necessary.

Project Title: Assistance in Conducting a Fully-fledged Feasibility Study for Establishing an Industrial Free Zone in Aden

Project. No. 7

Project Description

I. Information on the Project

Background Information about the Project and Justification

The idea of establishing an industrial free zone in Aden emerged from the unique geographical situation of Aden, which should be exploited to the welfare of the Yemeni population and encouraged by achievements of industrial free zones in some Arab countries. Preliminary investigations have indicated that some industrial East Asian countries would welcome setting some of their industries in Aden, when a free zone is established, and where semi-finished products can be reprocessed or rather parts assembled to the benefit of both partners.

The Government of PDRY asks for the experience of some developing countries in disclosing some queries and help in deciding upon establishing the free zone, giving technical assistance and legal advice about the terms that could be set-up for the welfare of the country.

The study, to be carried out, should illuminate and clarify the way that PDRY will follow and provide answers to 3 vital questions:-

1) First are the legal aspects, to judge if the legislation in PDRY are quite satisfactory or certain additions or amendments have to be introduced to attract users, protect the interests of PDRY and maximize national benefits, and suggest different terms with guest industries and forms of contracting (land lease, payments for facilities etc.).

2) Second, would be what activities would be more suitable and accepted by guest countries (assembly, manufacturing, storage etc.) and consequently, what are the layouts and designs in relation to activities, in different suitable (alternative) site locations and the needs of infra-structure and other facilities.

3) Third, would be an assessment of commercial and national profits.

Therefore, a 2-phase project aiming at undertaking a wide, comprehensive study is proposed and suggested to proceed in two consecutive/successive phases.

Phase I will provide the answer to the first question and give more evidence, enabling to judge the free zone and prepare for a final decision. Phase II will have to follow Phase I, only in case that the results of the legal studies give a green light for proceeding.

The first phase durates 3 months for legal and legislative aspects. The second is for the technical and engineering aspects and architectural designs and followed by the cost and revenue estimates and assessments of benefits and costs, and durates 4 months.

Technical assistance is called for from international and regional organizations, and developing countries with past experience and/or experts in these concerns.

Project Input Requirements

Phase I

		US$
-	Legal consultant with wide and deep experience, specialized in commercial law (20-15 years), with past experience in similar agreements for 3 months (3 m/m)	
	Costs	30,000
	Other Costs	1,500
	Total	31,500

Total for Phase I : US$ 31,500

Phase II

-	Experts	110,000
-	Technician	32,000
-	Other Costs	3,500

	US$
Total	145,500

Total for Phase II : US$ 145,000

Total Project Costs (Phases I and II)	177,000

II. Objectives of the Project

A) Development Objectives

Strengthening PDRY economy through seeking new activities that lead to additional income and foreign exchange.

B) Immediate Objectives

Examining the technical and economic feasibility of establishing an industrial free zone in Aden, for different alternative project designs, assessing their profitability (commercial, financial and national).

III. Outputs Expected and Subsequent Activities Required

A) Outputs

A comprehensive feasibility study covering all aspects as described in various manuals of project preparation, with special emphasis on legal aspects and contractual terms (between the host and guest countries) which will determine the viability of establishing the free zone. The study should elaborate surveys to define the appropriate activities, comprising possible alternative activities, alternative sites and consequently alternative benefits and costs. Evaluating commercial and national profitability of the different alternatives.

B) Activities

Phase I

- Studying deeply all PDRY legislations and laws and internal bi-laws

directly affecting or regulating the activities of free zones, or have indirect bearings.

- Studying legislations in different developing countries of different economic status, related to the free zones.

- Detecting any deficiencies and proposing necessary amendments and/or additions. Proposing terms of contracting with guest industries (lease, rent, fees etc.).

- Consulting eventually PDRY authorities, receiving or inferring directions in this concern. Duration 4 months (from month 1 to 3).

Phase 2

- Examining the status of the industrial sector in PDRY, for different subsector activities, experience acquired, skilled manpower etc.

- Surveying similar activities in developing countries and defining alternative industrial or other activities to be practised (amoallaging and packing/canning/assembly/manufacture/storage) and determine the land area required. In the light of the above and suggesting training programmes or fellowships to provide required skills,

- undertaking geographical site location surveys in the vicinity of Aden Port, to choose the suitable location and assessing needs from infrastructure and other facilities estimating costs.

- Drafting the layout and different blue prints for proposed design(s) computing construction costs for each (4 months, from months 4 to 7).

- Computing the costs incurred in industrial buildings, infrastructure, investment in providing power, water etc., store houses (cold, ordinary) etc., and benefits accruing from land lease/rent of industrial buildings/fees for facilities provided etc., according to suggested terms/ forms of contraction.

- Assessing the commercial profitability of the project using the relevant criteria in current use.

- Contacting the national planning experts, exchanging ideas and giving advice and technical assistance (participating in estimating the national parameters and shadow prices/price adjustments needed for the national

profitability evaluation, according to approaches and criteria in current use considering the underlying concepts described in AIDO/UNIDO Manual for Evaluation of Industrial Projects.

- Presenting the report with an executive summary for decision taking.

Duration 4 months.

IV. Assistance Sought

Technical and Financial Assistance

Providing the experts and technical assistants and for bearing/ financing their costs and other related costs:

For Phase I	US$ 31,500
For Phase II	US$ 145,500
Total	US$ 177,000

V. Inputs from the Government

- Providing adequate number of counterparts to assist the international consultants.
- Providing equipment for surveys and drawings.
- Providing suitable offices for work (specially for drawing)
- Providing secretarial facilities.
- Providing local transport.

Project No. 8

Preparation of a Feasibility Study To Establish Tomato Triple Concentrate 38 - 40%

I. Information about the Project

Background information about the project and justification

Consumption of tomato paste in PDRY is rather high and progressively increasing. Demand was satisfied through imports. A plant for tomato paste production (in Lahej), with a capacity to produce 1,600 tonnes of paste per annum, and started production since 1976, using fresh tomato fruits during the peak season of tomato crop (about 100 days), and processing imported tomato paste concentrates (of triple concentration) to the specifications suitable for final consumption during the off-season. Actual production of the firm fluctuated between 765 and 1,269 tonnes during the period 1976 - 1981, and the greater part of domestic demand is still satisfied by imports, as local production covers only about 20 to 25% of total demand.

UNIDO assisted in the implementation of the project and further assistance is required to implement recommendations regarding the improvement of the project productivity as well as recommending measures to solve technological, managerial, organizational and other problems in addition to advice, leading to increase the rate of utilization of installed capacity.

A step was taken by the end of 1984 in order to run the project at a higher capacity by installing a line for processing imported high concentrated paste during the off-season of tomato crop, and production of tomato paste for final consumption, but still production is far below the domestic demand.

Accordingly, further expansion of tomato paste production to satisfy a greater portion of domestic demand was one of the ideas proposed for new investment opportunities (conformable with sectoral and broad development objevtives), on condition that cultivable land irrigation water is available. These requirements are believed to be fulfilled in Wadi Hadramaut, in addition to proper access to main roads and availability of manpower. Thus a proposal for establishing another tomato paste plant in Hadramaut was submitted, with a capacity to be defined after an accurate assessment of the cultivable land area and irrigation water available. Two alternative proposals as regards the product are under question; one entailing the production of tomato paste

with specifications suitable for final demand, the other is to produce high concentrated tomato paste, process part of it to the concentrations suitable for final demand, and the remainder is to be delivered to the tomato paste firm at Lahej, thus substituting imported, concentrated tomato paste input, and leading to more capacity utilization.

Consequently, undertaking a comprehensive feasibility study to explore the possibility and extent of cultivating new lands at the Wadi Hadramaut, estimate the expected (proven) annual crop, and define the appropriate annual production capacity of the new firm accordingly. A comparison between the above two alternative proposals for the product has to be set up, denoting the benefits and costs of each of the two proposals and assessing their commercial and national profitabilities, to help taking a final decision.

Project input requirements

A team of 5 experts composed of:

- A high-qualified agronomist with considerable experience in tomato cropping for 1 month (1 m/m)
- A market analyst with considerable experience for 1 month (1 m/m)
- An industrial engineer with considerable experience in food industries and in tomato paste processing in particular for 2 months (2 m/m)
- Financial analyst with considerable experience in cost accounts and financial analysis for 2 months (2 m/m)
- Industrial economist with considerable experience in project evaluation in general and with specific experience in national profitability (benefit/cost) analysis for 1 month (1 m/m).

The team will make use of the facilities of other projects in the agricultural sector, in the fields of land surveys and water resources, and in collaboration with Yemeni counterparts, with temporary participation of a Yemeni civil engineer.

Total: 7 m/m	Cost: US$ 70,000
Costs: Experts	US$ 70,000
Total project costs	US$ 70,000

II. Objectives of the Project

A. Development Objective: Increasing tomato paste production to meet the local demand through taking the right decision, based on a comprehensive study.

B. Immediate Objectives: Examining the technical and economic viability of complex to cultivate tomato plant and process the tomato fruit. Comparing the profitability of the two alternative proposals as to the specifications of the product (in case of further processing the whole production of the initially produced (semi-finished) high concentrates to specifications fit for final demand (double concentrate) and in case of delivering a part of the high concentrate to Lahej tomato paste firm (as an input), for further processing).

III. Outputs Expected and Subsequent Activities Required

A. Outputs: A comprehensive pre-feasibility study covering all aspects of the proposed agro-industrial complex, comprising:

1. Assessment of the cultivable land and water resources - defining the area that could be cultivated - estimating the volume of tomato fruit produced - estimating the investment costs needed for tomato cultivation (land preparation, irrigation facilities, etc.) - estimating production inputs (seeds) fertilizers - manpower etc., and the consequent annual production costs of tomato fruits.
2. Market analysis, projecting future demand. Defining the capacity of the industrial firm for tomato processing - production technology (ies), related investment costs (denoting local and foreign components), site location and off-site infrastructural facilities needs and its cost - production inputs in quantity and in value, denoting separately the value of imported inputs - labor inputs in details specifying needed numbers of different specializations and skills - administrative, managerial and legal aspects - detailed engineering aspects and time schedule for implementation - production schedule and estimations of annual sales revenue - marketing and transport costs - preparing the 3 financial statements (income statement, annual budgets and cash flows). Investment, running and transport costs have to be estimated for the two alternatives as regards the product specifications and consequently the income statements in the two cases.

3. Profitability evaluation (commercial and national) for the two alternatives of project output clearly denoting differences in costs and benefits, and net benefits of each - with careful regard to extra benefits that may accrue as a result of more capacity utilization of Lahej firm.

B. Activities:

- Data collection and analysis (market and demand projections during the first month).
- Undertaking the process of project preparation mentioned above, according to manuals in use, specially UNIDO Manual for the preparation of Industrial Feasibility Studies.
- Undertaking the processes for evaluating the 2 alternatives, assessing commercial and national profitability of each, using the well-known criteria, especially those described (recommended) by IDCAS (AIDO)/UNIDO Manual for Evaluation of Industrial Projects as regards national profitability evaluation.
- Finalizing the report after due discussions with PDRY authorities.

IV. Assistance Sought

Technical Assistance:
Provision and/or financing the costs of expert team and other costs needed for producing the report: Total project cost US$ 70, 000

V. Inputs from the Government

- Providing necessary data and statistics
- Providing transport facilities to the site and bearing the costs US$ 1,500
- Providing the services of a national civil engineer
- Providing national counterparts
- Consulting with the experts whenever necessary.

Project No. 9

The Provision of Technical Assistance Related to Training of National Staff in the Operation and Maintenance of New Cement Factory

I. Information about the Project

Background information about the project and justification

The Third Five Year Plan (TFYP) includes a project for cement manufacture, at an annual capacity of 350,000 tonnes, with total investment costs of 31,789,900 YD, equivalent to about 92,190,710 US$. It is planned that implementation will take about 4 years, beginning from the second half of 1985, till early 1989.

The Government intends that such a big project with high investment costs, established for the local production of an important investment commodity (cement) should secure a smooth running, without bottlenecks or obstacles originating from abuse of equipment or lack of preventive and current maintenance and thus intended to provide required national skills ahead of the date of running-in period. Consequently a plan for training various cadres of different levels and specializations entails massive training of engineers, foremen and skilled workers in the fields of limestone quarrying and clay excavation, cement production processes, clinker production, operation of kilns, grinding, packaging, production facilities (water treatment - cooling - workshop - laboratory work, etc.), and in particular maintenance for power station and electrical network, maintenance of mechanical equipment and other facilities. Training is intended to begin by the first year of implementation and technical assistance of international and regional organizations and developing countries with well-established cement industry is called for.

Project input requirements

A. Fellowships:

16 fellowships for graduated chemical, mechanical, electrical engineers, and chemists for academic study and practical training in the fields of quarrying, clinker processing and grinding, power station operating, maintenance of machines and equipment and power station and chemical analysis. Duration ranges between 12 to 18 months abroad, amounting in total to 264 m/m. They are distributed as follows:

Quarry	1 fellowship for 18 m/m
Cement production and production facilities/ services	8 fellowships for 126 m/m (6 for 18 months each and 2 for 9 months each)
Maintenance	6 fellowships for 102 m/m (5 for 18 months and 1 for 12 months)
Industrial management and cost accounts	2 fellowships for 18 m/m

Total 17, of which 3 local (36 m/m) and 14 abroad (228 m/m). Cost: US$ 502,000.

B. Training Workshops:

43 awards for training future foremen and technicians (mainly secondary school level, some of preparatory school level and few of primary school level) in various technical operations (quarrying, processing, grinding packing, workshop, laboratory work, power station operating, water treatment, electrical, mechanical, vehicle (heavy truck) maintenance). Training provides basic theoretical teaching concentrating on practical training abroad (for some) and locally (in workshops - technical institutes, etc.), for periods ranging from 6 to 12 months, amounting in total to 360 m/m, distributed as follows:

Quarry	6 trainees	6 m/m
Production	30 trainees	282 m/m
Maintenance	7 trainees	42 m/m
Total	43 trainees	330 m/m

of which 15 local (108 m/m) and 28 abroad (222 m/m), cost US$ 488,000.

An expert in designing and conducting training programmes for 6 months (6 m/m), cost US$ 60,000. Total: US$ 548,000.

C. Staff and Technicians:

A number of experts to stay for 2 years to assist in operating the quarry and the firm and train national operators as follows:

1. A qualified chemist having experience in X-ray analyses
2. Ten technicians, foreman category, to carry out production and guide/supervise maintenance of the quarry and cement producing plant, distributed as follows:

Quarry	1 quarry foreman experienced in limestone quarrying
	1 car (truck) technician
Cement factory	1 mechanical technician for the production process

Cement factory		1 mechanical technician for the workshop	
		1 mechanical technician for packing	
		2 electrical technicians	
		2 instrument technicians	
		1 technician for the kiln (burner)	
Cost:	Chemist	24 m/m	US$ 72,000
	Technician	240 m/m	US$480,000
	Total		US$552,000

Total Project Costs

- Fellowships	US$ 502,000
- Training workshop:	
Awards	US$ 488,000
Training	
Expert	US$ 60,000
Staff and technicians	US$ 552,000
Total	US$ 1,602,000

II. Objectives of the Project

A. Development Objective: Efficient performance of newly established industrial firms as a means to attain efficiency of the industrial sector and overall efficiency.

B. Immediate Objective: Preparing the adequate number of high technical staff and middle-level foremen and technicians required for the various processes of cement industry to meet the requirements of the cement factory.

III. Outputs Expected and Subsequent Activities

A. Outputs:

- 17 up-graded university graduates mastering different techniques of quarrying cement production, maintenance of equipment and management
- 42 middle-level technicians trained on various processes and operations of cement production and related production services
- Supplementing the cement factory with foreign skills at the first two years of production.

B. Activities:

- Defining universities, technical institutes and firms for the fellowships and training workshops
- Nominating different trainees for the fellowships, and the middle-level technicians for the training workshops
- Orientation/preparing and briefing of the nominees (including training courses in foreign languages when necessary)
- Periodical follow-up of trainees abroad
- Designing and conducting local training
- Selecting and providing foreign experts and technicians

IV. Assistance Sought

Technical Assistance:

To be carried out by participating countries:

- 12 awards for engineers, chemists
- 2 awards for business economist and administration

(Total cost: US$ 502,000).

- 28 training workshops/on-the-job training fellowships for middle-level cadres/foremen and technicians (US$ 488,000).
- Providing and/or financing the expenses of training expert (US$ 60,000).
- Providing and/or financing the costs of foreign staff and technicians (US$ 552,000).

V. Inputs Required from the Government

- Choosing the suitable nominees for fellowships
- Providing salaries (for already employed) and suitable compensation for non-employed, if due, during the period of their training.
- Orienting the awarded personnel and undertaking linguistic training.
- Periodical follow-up of the progress of trainees through examining reports sent about their progress and/or periodical inspection.
- Providing national counterparts for foreign staff and technicians.

Total project cost: US$ 1,602,000.

Project No. 10

Preparation of a Feasibility Study To Establish a Unit for the Production of Butagas Cylinders

I. Information about the Project

Background information about the project and justification

The consumption of butagas for household purposes is increasing, due to progressive change of consumption habits, urbanization and the expansion of modern life throughout the country. Butagas is produced in Aden refinery, but the cylinders used for bottling are imported, and annual additions of cylinders are needed.

The idea of producing liquid butagas cylinders (LBG) emerged from recommendations of UNIDO experts, who pointed out the possibility of adding a unit to produce LBG in the factory, taking advantage of the existing facilities in the firm (AIF), as a means to diversify its product mix. A rough estimatation of its production capacity was provided, and a recommendation to carry out a detailed study was proposed. Equipme required for the recommended line of LBG production and training were described.

Accordingly, a feasibility study, to define the production capacity and revise the needs from additional equipment is required to help decide upon the technical and economic viability of producing LPG cylinders in AIF through establishing an additional line of production at AIF.

Project input requirements

A team of experts comprising:

- An experienced mechanical engineer (3 m/m) in related technology for 3 months (3 m/m)
- An experienced market analyst for 1 month (1 m/m)
- Financial analyst with experience in financial, commercial and national profitability analyses for 3 months (3 m/m)

Total: 7 m/m.

Expert costs (7 m/m)	US$ 70,000
Other costs	US$ 1,000
Total Project Costs	US$ 71,000

II. Objectives of the Project

A. Development Objective: Strengthening the mechanical industries in PDRY by seeking means to diversify the products of agricultural implements factory, using some of the already installed assets, producing a commodity to meet the local demand, with the possibility of foreign exchange savings.

B. Immediate Objectives: Assessing the commercial and national profitability of a project for adding a new line for producing butagas cylinders in AIF, according to which a decision in this concern (acceptance, rejection or modification) can be taken - based on a comprehensive study.

III. Output Expected and Subsequent Activities Required

A. Outputs:

A detailed pre-feasibility study covering technological, financial, economic and other aspects, stressing in particular market analysis and demand forecasts, revising and up-dating the technical aspects and the list of equipment proposed by the former UNIDO experts, and in short fulfilling the requirements specified in the UNIDO Manual for the preparation of Industrial Feasibility Studies, and assessing the commercial and national profitability of the project, (preferably as described in AIDO/UNIDO Manual for the Evaluation of Industrial Projects as regards national profitability criteria).

B. Activities:

- Collecting and analyzing data for market analysis and demand forecasts
- Examining the former experts' reports (revising the proposed equipment, up-dating introducing necessary amendments)
- Completing the detailed investment proposal, and undertaking the commercial profitability evaluation applying the COMFAR software for financial and sensitivity analyses
- Consulting and collaborating with authorities of the Ministry of Planning for deciding upon national parameters and price adjustments to be used for the national profitability evaluation and for selecting the appropriate national profitability criteria to be used for the national profitability evaluation.
- Discussing the final results with PDRY authorities.

IV. Assistance Sought

Technical Assistance:

Providing and/or financing the costs of a team of experts and related costs (US$ 71,000).

Total Project Cost: US$ 71,000.

V. Inputs Required from the Government

- Providing necessary (available) data and statistics
- Providing suitable national counterparts.

Project No. 11

Technical Assistance to the "Study Department"
Ministry of Industry

I. Information about the Project

Background information about the project and justification

The Study Department, (supervised by an assistant deputy minister who is in charge of this Department and Industrial Documentation Centre), is assigned the research and procedures related to pre-investment studies, in fields of project preparation and evaluation, and also taking the first step of implementation.

It is sub-divided into 3 main sections:

- Research section: which is assigned project identification and detecting new investment opportunities. Its main activities are the market studies, sectoral studies and other research necessary for identifying new ideas (which seem to be promising) to be subjected to further studies.
- Feasibility studies section which undertakes the processes related to project preparation; beginning by scrutinizing the project ideas, for choosing those projects for which pre-feasibility or feasibility studies have to be prepared, defining the specifications required for such study, drafting terms of reference for consultants, evaluating their bids to choose the best, helping consultants in the collection of data necessary for the feasibility studies, revising the studies and asking amendments or additions (when necessary) and finally to carry out the process of project promotion.
- Contracting Section: which undertakes preparation of pre-qualification documents to be announced for machine producers, setting up bids for procurement of machines, comparing and analyzing the different offers and reporting to a committee which selects the most appropriate offers, negotiating with the related companies to get better terms and reporting once more to the decision-taking committee which chooses the best offer, and finally contracting with the company with the best offer for machine provision, and the follow-up of the execution of contracts drawn with machine suppliers.

Realizing the vital importance of a proper identification, (based on sound market and sub-sectoral studies), elaborate project preparation and selection in addition to efficient bidding, negotiating and contraction with reputed machine suppliers, the Ministry of Industry (PDRY) asks for technical assistance, aiming at examining the present performance of the three sections of the Department, tracing/identifying any bottlenecks or deficiencies, and finally recommending different means and measures to attain more efficient and speedy performance.

Project input requirements

A high-calibre expert in industrial organization and management, with background experience and pre-investment studies and processes and actions related, and their requirements of different disciplines, organizational set-up and performance standards, for 4 months (4 m/m).

Expert costs	US$ 40,000
Other costs	US$ 1,000
Total Project Costs	US$ 41,000

II. Objective of the Project

A. Development Objective: Strengthening the capability of the Ministry of Industry to undertake planning and implementation of Industrial Development Projects.

B. Immediate Objective: Establish a suitable organizational set-up within the Ministry of Industry to carry out efficiently project identification, preparation, evaluation and contracting.

III. Outputs Expected and Subsequent Activities

A. Outputs

A report recording and describing the present performance of the Study Department, Ministry of Industry, containing the appropriate organizational chart for the suitable organizational set-up; job description and the required numbers of different specializations and suggesting necessary by-laws which ensure appropriate linkages between its sections and flow of operations.

B. Activities:

- Examining the present performance of the 3 sections according to objective norms

- Reviewing the organizational structure, the number and specializations of the staff and functions assigned to the 3 sections, to judge how the organizational structure and staffing match with functions assigned to the 3 sections (and fulfill the requirements)
- Studying the interrelation between the 3 sections, and between the Department as a whole and other Departments of the Ministry of Industry and the flow of operations and the procedural steps related to the whole task of project identification, preparation, evaluation, negotiations and contracting
- Setting up recommendations and proposals including:
  - A new organizational chart to raise the performance including job description and the appropriate numbers of employees from different specializations.
  - Formulating a schedule for the appropriate sequence of procedural steps - which ensures smooth and easy flow of work and complementarity between the 3 sections of the "Study Department" on the one hand, and between the Department and other Departments of the Ministry of Industry on the other, avoiding gaps and overlaps.
- Submitting a report describing the present performance, points of weakness and pointint out clearly recommendations for raising the efficiency, such as re-organization, additional staff, etc., in addition to further technical assistance required.

IV. Assistance Sought

Technical Assistance:

Providing and/or financing a high-calibre expert in industrial organization and management and bearing other related costs for 4 months (US$ 41,000).

V. Inputs Required from the Government

- Availing necessary information (present organizational chart, detailed description of functions assigned to the Department, number and qualifications of the staff. The development of the Department and its outputs since the beginning up to the present, etc.).
- Providing suitable counterpart(s).

Project Title: Technical Aid to the three Sections of the Study Department - Ministry of Industry

Project No. 12

Project Description

I. Information on the Project

Background Information about the Project and Justification

The Assistant Deputy Minister in charge of the Study Department and Industrial Documentation Department/Centre expressed the desire to upgrade the staff members working in the two departments through technical aid, in the form of offering or financing several fellowships. This project will comprise the requirements of the three sections belonging to the Study Department.

First is the requirements of the Research Section, whose functions are to search for investment opportunities/project identification, based on market studies and other subsectors studies carried out by the Section, in addition to the opportunities created through inter-sectional relations due to backward and forward links withi the context of the overall development plan. Such an activity demands - in addition to the specialization in market analysis and subsector analysis etc. - deep knowledge of sectoral planning, input and output analysis, and general issues pertaining to the relation between national and sectoral planning. Thus, the necessity of upgrading staff members in these concerns is deemed essential.

Second is the requirements of the Feasibility Studies Section, which is assigned the project preparation through specifying the contents of the feasibility studies (setting up terms of reference) to consulting firms, choosing the appropriate consultants, revising the prepared feasibility studies, undertaking project evaluation and project promotion. The Section seems to be well-staffed by members having 8-10 years experience and having attended various short term workshops and seminars held by international and regional organizations. Yet, the necessity of deeper knowledge is felt. This can be obtained through fellowships to specific universities or institutes which offer the chance of more academic learning supplimented by practical application. The suggested topics are the various issues related to project preparation, with special emphasis on project design and engineering aspects, choice of appropriate technique and technology, economies of scale

etc. and the process related to project evaluation, financial and economic analyses, pricing of costs and benefits, different evaluation approaches and criteria for national profitability analysis, national parameters etc., where the theoretical basis is deepened and concepts ascertained through case studies.

Third is the requirements of the Contracting Section for increasing the skills in bidding, negotiating and contracting, through rather short courses and exercises, workshops and seminars. The need to deepen and widen the knowledge through fellowships is highly justified by the requisites of the rapidly growing industrial sector.

Project Inputs Required

- One fellowship for the Research Section for 9 months on sectoral planning (9 m/m).

- Two fellowships for the Feasibility Studies Section and Research Section for 9 months each in project preparation and evaluation (18 m/m).

- One short-term fellowship (for about 3 months) for the Contracting Section, on negotiating, bidding and contracting (3 m/m).

Total : 30 m/m
Cost : US$ 66,000

Total Project Costs : US$ 66,000

II. Objectives of the Project

A) Development Objective

Improving the capabilities of the Industrial Sector resulting from deeper knowledge of the relationship between the overall and the sectoral planning, project formulator and evaluation, negotiation and contracting.

B) Project Objectives

Upgrading a number of the staff members of the Study Department through acquiring deeper knowledge in the fields of sectoral planning within the context of national planning, inter-industrial relations, input and output analysis, project formulation, project evaluation and negotiations and contracting.

III. Outputs Expected and Activities Required

A) Outputs

Four upgraded experts, one acquiring wide vision and full conception of the relation between the macro, (sectoral) planning and individual projects, two experts mastering processes of project preparation and techniques of project evaluation, and the fourth with additional skill in negotiating and contracting.

B) Activities

- Defining the universities/institutes where such studies are available.
- Nominating members of the Research Section to be awarded.
- Taking necessary measures for the travel of nominees.
- Frequent follow-up of candidates in long missions (through progress reports and other means) till the end of the mission.

IV. Assistance Sought

Technical Aid

Providing and/or financing the costs of the fellowships.

Total Cost : US$ 66,000)

V. Inputs from the Government

Paying the annual salaries and fringe benefits to the candidates during the period of their missions abroad.

Project Title: Technical Aid to Industrial Documentation Centre

Project No. 13

I. Information about the Project

Background Information about the Project and Justification

One of the main functions of the Documentation Centre is the collection and storage of information and data related to different diversified subjects of industrial development (national and international), including various statistics to be utilized when required, thus forming the nucleus of a data bank. AIDO assisted in the implementation of this project, however, further technical and financial aid is required to complete the project.

In addition, technical aid is deemed essential, to up-grade the experts working in the department/centre through acquiring deeper knowledge in programming and data processing. For this purpose it has been suggested by the Documentation Centre and Study Department to ask for assistance, to offer or finance the attendance of 5 of the high staff members belonging to the Documentation Centre, including the key person in charge of the Department and heads of the 3 Sections of the Study Department (data users) training seminars and workshops (duration 1-2 months). Calling for technical assistance to acquaint leading staff members with data processing, storage and retrieval processes is justified by the increasing requirements of planning the rapidly growing industrial sector.

Project Input Requirements

Five awards for short term training seminars or workshops for 3 months. Total 15 m/m.

Cost : US$ 33,000

II. Objectives of the Project

A) Development Objective

Improving industrial planning processes (resulting in the formulation of more feasible plans).

B) Immediate Objective

Raising the technical skills and capabilities of 5 staff members of the Study Department and Industrial Information Centre, which helps the development of the data bank.

III. Outputs Expected and Activities Required

A) Outputs

5 upgraded experts, acquiring additional knowledge in the field of data processing, storage, retrieval and programming.

B) Activities

- Defining the appropriate workshops or Seminars.
- Nominating the appropriate trainees according to a time schedule securing the performance of day-to-day duties.
- Taking necessary measures for travel of nominees.

IV. Assistance Sought

A) Machinery and Equipment

Financial aid amounting to US$ 26,000 to procure the remaining machines for the former above-mentioned project, financed by AIDO.

B) Technical Aid

Providing and/or financing the costs of training workshops and seminars (US$ 33,000).

Total cost: US$ 59.000

V. Inputs from the Government

Paying the salaries, fringe benefits and incentives to the candidates during the period of their training abroad.

Project Title: Survey of the Industrial Sector to identify Areas for Private Sector Activity and Incentives Recommended

Project No. 14

Project Description

I. Information on the Project

Background Information about the Project and Justification

Since the early seventies, with the evolution of socio-economic planning in PDRY, economic activities are undertaken by 4 sectors, namely:

- The Public Sector which has the leading part
- The Mixed Sector (public and private participation)
- Co-operatives
- The Private Sector

In the industrial sector the role of each of the four sectors can be illustrated by their relative shares in production:

Sector	1980 Actual	1985 Estimated		1990 Planned	Average rate of growth between 1985-1990
		at 1980 prices	at 1985 prices		
Public Sector	48.4%	48.5%	52.2%	48.9%	13.7%
Mixed Sector	41.8%	32.4%	32.0%	40.0%	20.4%
Co-operatives	2.0%	10.6%	6.9%	4.4%	4.9%
Private Sector	7.8%	8.5%	8.9%	6.7%	8.9%
TOTAL	100%	100%	100%	100%	100%

The value of the production of the private sector is planned to increase from about 3183 (thousand Yemeni Dinar) in the year 1985, to 4864 in the year 1990 (at constant 1985 prices), at an average rate of increase of 8.9% per annum.

To attain the planned investments proposed for the private sector activity for the TFYP (1986-1990 Third Five Year Plan) 1584 (thousand Yemeni

Dinars), representing 2.7% of total investment/allocation of the industrial sector (amounting to about 58.552 thousand Yemeni Dinars). Presently, firms belonging to the private sector produce a variety of commodities, mostly for final consumption, of which are: plastic products, apparel, carpets, macoroni and ice with some intermediate and capital goods such as paper bags, welding bars and aluminium products for buildings.

The Government of PDRY attempts at defining the future areas of industrial activities for the four sectors, within the allocated investments, annual growth rates for each and the defined/desired relative weights of the four sectors. In order to attain this objective and help detecting feasible investment opportunities suitable for each of the sectors and for the private sector in particular, a comprehensive study for the industrial sector is proposed to be carried out. It is suggested that it has to start from the overall macro-economy, identify problems, suggest relevant policies and appropriate incentives to induce the participation of the private sector in industrial activities (within the defined investments and its role relative to the other sectors). Moreover, measures/policies and means to attract the remitted savings of the expatriate Yemenis have to be sought in particular. Means to detect these measures, as well as criteria to be used for the economic evaluation of projects have to be identified. The study must culminate, by proposing some 20-25 project ideas suitable for the private sector activity, to carry out opportunity studies for these projects as a means to define activities and induce/attract the participation of the private sector.

Project Input Requirements

- Experienced industrial economist (for surveys, problem detection, project identification) for 3 months (3 m/m).
- Financial analyst experienced in project evaluation for 3 months (3 m/m).
- Economist (for national parameters, shadow prices and incentives) for 3 months (3 m/m).

Total 9 m/m

	US$
Cost	90,000
Other costs	3,000
Total Project Costs	93,000

II. Objectives of the Project

A) Development Objectives

Ensuring the participation of the private sector in industrial activities within its defined role and planned growth rate.

B) Immediate Objective

Define the areas of private sector activities and identifying various incentives required to induce private sector participation.

III. Outputs Expected and Activities Required

A) Outputs

A comprehensive study for the industrial sector, comprising:

- description of the present status of the industrial sector;
- diagnosis of the prevalent problems;
- detecting subsectors activities appropriate for the private sector;
- opportunity studies for new projects (belonging to suggested activities) subsectors);
- investment criteria recommended for commercial profitability and national profitability evaluations;
- policies and incentives suggested to encourage and attract the private sector.

B) Activities

- Data collection (for macro and sector levels).
- Data analysis.
- Problem diagnosis through (a) visits to firms and (b) referring to follow-up reports and performance evaluation reports.
- Detecting appropriate project ideas and carrying out opportunity studies.

- Detecting proper incentives through cost and price analysis and the consulting with PDRY officials.

- Recommending national evaluation criteria, national parameters and other (shadow) prices for national profitability evaluation through consulting with PDRY Government officials in the Ministry of Planning and the Ministry of Industry.

- Preparing, presenting and discussing the results of the study with PDRY officials.

IV. Assistance Sought

Technical Assistance

- Provision of experts for undertaking the study and/or financing the study:

Total cost : US$ 93,000

V. Inputs from the Government

- Providing competent counterparts.
- Providing necessary data.

- Arranging and financing internal visits to various factories in PDRY when required (equivalent of US$ 1,500 in local currency).

- Discussing with the experts, providing the elements and directives related to defined policies, national policies, national parameters, legislations, regulations etc.

or

- Setting-up terms of reference for the study to be carried out by a consulting firm, revising the interim and final reports.

Project Title: Assistance for the Clothing Industry (Apparel Production) Project No. 15

Project Description

I. Information about the Project

Background Information about the Project and Justification

Production of clothes/apparel is carried out in PDRY through four co-operatives (in Aden, Lehej, Abyan, Hadramut) and a few firms - one belonging to the public sector and three to the private sector. Products are mainly school uniforms, overalls for workers and a limited variety of other pieces (blouses, trousers, shirts). Production in 1985 is expected to be 458.5 thousand pieces and planned to reach 685.9 in 1990; as can be seen from the following table:

	Production of ready-made clothes in 1000 pieces		
	1980 Actual	1985 Expected	1990 Planned
Public Sector (Maryters' Garment Factory)	77.2	122.5	182.2
Co-operatives	38.5	68.6	180.5
Private Sector (3 factories)	239.9	230.8	296.0
	355.6	421.9	658.7

The quantities produced presently, as well as the expected, are far below the domestic demand in numbers and - more important - in quality and specifications. Consequently, demand is largely satisfied by imports.

The public sector (Maryters' Garment Factory (MGF), as well as the Co-operatives - whose production (together) amounted to 32% of total production in quantity in 1980 and is planned to reach 55.1% in 1990 - face some problems and call for assistance - mainly technical. As to the Co-operatives (established during the years 1971 to 1977), they suffer from some difficulties. The most prominent are unsuitable-old-equipment (in bad condition due to insufficient and improper maintenance), lack of appropriate experience in market requirements and lack of fashionable designs, and consequently unsuitable low quality products unable to compete with other

local production and imports. As to the Maryters' Garment Factory (MGF), it needs technical assistance in designs, diversification of items produced and improvement of finishing and attractive/proper packing of products to match domestic demand and compete with imported items. The required assistance represents the urgent short-term needs. As for the long run, a comprehensive survey for the clothes (apparel) manufacturing subsector is planned to be carried out (including a detailed survey analysis of problems and a master plan) with the purpose of strengthening this branch of industry to meet the future demand, to which a separate project is presently proposed.

Project Input Requirements

A) Experts

- An expert in design, cutting, tailoring/sewing and finishing of clothes, with deep practical experience, for 12 months (12 m/m). Cost: US$ 120.000.

- An expert in maintenance of machinery of clothing industry (cutters, sewing machines, irons etc.) for 6 months (6 m/m). Cost: US$ 60.000.

- An expert in cutting and tailoring, experienced in designing and conducting training programmes in this field for 3 months (3 m/m). Cost US$ 30.000.

- An expert in production planning and management, experienced in designing training programmes for 5 months (5 m/m). Cost : US$ 50,000.

Total Experts 26 m/m.

Cost	US$ 260,000
Other Related Costs	US$ 4,000
Total Cost:	US$ 264,000

B) Practical Training Fellowships

- Six in the field of design making, 3 months each. Total 18 m/m. Cost : US$ 40,000.

- Six in the field of cutting and tailoring (2 for MGF, one for each of the 4 co-operatives) for 3 months (18 m/m). Cost : US$ 40,000.

Total 36 m/m. Cost : US$ 80,000.

C) Machinery

- Sixty modern sewing machines (15 for each of the 4 co-operatives). Cost : US$ 162,000.

Total Project Costs : US$ 506,000

II. Objectives of the Project

A) Development Objectives

Supporting the clothing industry through upgrading the capabilities and raising the efficiency of Maryters' Garment Factory and the Co-operatives; diversifying and upgrading the quality of the products to satisfy a greater part of local demand with possible price reductions to the interest of consumers.

B) Immediate Objectives

- Raising the capability of operating personnel in Maryters' Garment Factory and of members of Co-operatives in the fields of design production, maintenance of machinery, costing and management.
- Supporting Co-operatives by providing necessary machines.
- Diversitying and improving the quality of products.

III. Outputs Expected and Subsequent Activities Required

A) Outputs

- New modern designs for different types of clothes.
- Upgradded production operators, managers and co-operative members in the fields of design preparation, cutting and tailoring, finishing and packing as well as maintenance and costing.
- 60 new sewing machines supplied to Co-operatives.

B) Activities

- Selection of appropriate experts and taking measures for the fielding at PDRY.
- Experts examining the present conditions in the MGF and Co-operatives, identifying the weaknesses and shortages in present designs.
- Providing new/modern designs, adapted to suit the demand requirements in PDRY.
- Assisting the re-orginization of design sections and training nationals (employees and Co-operative members) in the field of design preparation.
- Defining the maintenance requirements to improve the existing/ installed machinery, defining the required spare parts and efficient

inventory control, and preparing the suitable programmes for (future) preventive maintenance.

- Defining the necessary replacements and related dates for different machinery.

- Training the local (national) personnel in maintenance of different machines.

- Nominating the appropriate personnel for the fellowships and defining the proper places for their practical training by the experts, preferably in well established factories of some Arab or Anglophone countries.

- Designing and executing training programmes locally by the previously awarded (trained) personnel and the supervision of the experts.

- Procurement of 60 suitable sewing machines.

IV. Assistance Sought

A) Machinery and Equipment

60 sewing machines (for Co-operatives). Cost : US$ 162,000.

B) Technical Assistance

- Providing and/or financing 4 experts and related costs.
  Cost : US$ 264,000.

- Providing and/or financing the costs of training fellowships.
  Cost : US$ 80,000.

Total Project Cost : US$ 506,000

V. Inputs from the Government

- Providing necessary data and information about the MGF and Co-operatives.
- Providing appropriate counterparts.
- Nominating suitable personnel and Co-operative members for the fellowships.
- Paying salaries and fringe benefits to the personnel and compensating members to be trained abroad.
- Bearing the costs of internal transport (the equivalent of US$ 1,500

Project Title: Assistance to Leather Industry Project No. 16

Project Description

I. Information about the Project

Background Information about the Project and Justification

Leather footware is produced in PDRY by a modern factory "The Leather Shoe Factory" (LSF) and 7 Co-operatives for leather industries, which produce, in addition, various leather articles. Still the quantities produced are far below the domestic demand as regards quantity and specifications are concerned. Production is expected to be 260 thousand pairs of shoes in 1985 and is planned to reach about 379 thousand pairs in 1990 (excluding slippers).

	1985 (Expected)	1990 (Planned)
Leather Footware Factory	200.0	264.8
Leather Products Co-operatives	60.0	114.0
Total	260.0	378.8 '000 pairs

An increase in the volume of production of leather shoes by both Co-operatives and the public sector factory is planned, implying a total increase of about 45.7% by the end of the plan period, between 1985 to 1990, at a higher rate for the Co-operatives (90%) than that of the factory (32%) with the result that the share of Co-operatives will increase from about 23% of total production in 1985 to reach 30% in 1990. Yet, both the factory and Co-operatives face some difficulties at present, caused mainly by the lack of proper designs especially for high quality products needed for some segments of domestic demand, lack of technological capabilities - especially in Co-operatives, in addition to the relatively high cost. Such a situation necessitates technical assistance to upgrade the technical and economic capabilities in different aspects related to footware and other leather products industry, mainly: market analysis and marketing design, production technology, maintenance and management.

Project Input Requirements

A) Experts

- Expert in industrial management/industrial engineer with past experience of 10-15 years in shoe factories, for 9 months (3 for the factory, 6 for Co-operatives), (9 m/m). Cost : US$ 90,000.

- An expert in market analysis with 10-15 years experience for 2 months (2 m/m). Cost : US$ 20,000.

An expert in shoe design (engineer/technician) with 10-15 years experience in shoe design, with training abilities, for 6 months (6 m/m). Cost : US$ 60,000.

- An expert in designing and conducting training programmes to give training advice, design and supervise internal training programmes for 6 months intermittently (6 m/m). Cost : US$ 60,000.

Total experts 23 m/m	Cost :	US$ 230,000
Other costs		US$ 3,500
Total		US$ 233,500

B) Training Fellowships

- 4 fellowships (abroad) in the fields of marketing, design, production, maintenance and management for 9 months. Total 36 m/m. Cost US$ 79,200.

- Three fellowships (abroad) for 3 months (under the guidance and supervision of the training expert/ to train 3 of the local personnel in the fields of design, production and management, to undertake training of others in the future, under the supervision of the training expert (9 m/m). Cost US$ 19,800.

Total training fellowships 45 m/m.
Cost : US$ 99,000.
Total Project Cost: US$ 332,500.

Objectives of the Project

A) Development Objectives

Strengthening and developing shoe manufacturing and leather products industry in general, to satisfy more of the local demand, with probable cost and price reductions.

B) Immediate Objectives

- Raising the efficiency in the Leather Shoe Factory and Leather Products Co-operatives in general.

- Diversification of outputs (products) of Leather Shoe Factory and Leather Products Co-operatives, to satisfy more of the domestic demand.

- Upgrading of nationals in the fields of design, production, maintenance, costing and management of shoe factories.

III. Outputs Expected and Subsequent Activities Required

A) Outputs

- New designs for shoes and production plans for LSF and Co-operatives, aimed at covering more of the domestic demand.

- Recommendations as regards new products or brands for diversification of outputs.

- Recommendations for raising the efficiency of the LSF and Co-operatives in general, including technological, marketing and other aspects.

- Trained/upgraded national staff and operators in the fields of industrial management, footware design and production, maintenance and cost accounts.

B) Activities

- Selection of suitable/appropriate experts and taking measures for their recruitment and fielding.

- Undertaking market analysis, detailed for different segments, and projections for future demand.

- Examining the present situation and conditions of machinery and production processes in LSF and Co-operatives and proposing necessary changes in procedural steps.

- Specifying additional equipment and necessary replacements and assessing the related costs, for both LSF and Co-operatives, in the fields of design, production and maintenance.

- Selecting suitable institutions, universities for study fellowships and factories (in developing countries) for training workshops,

nominating the trainees and taking necessary measures in this concern.

- Designing and executing local training programmes.

VI. Assistance Sought

Technical Assistance	US$
Providing and/or financing 3 experts and related costs	233,500
Providing and/or financing the fellowships	99,000
Total Cost	332,500

V. Inputs from the Government

- Providing suitable counterparts.
- Providing necessary data and information.
- Nominating the suitable personnel, operators and members of Co-operatives for fellowships and training workshops, paying their salaries and fringe benefits and compensating Co-operative members during the period of their training.
- Bearing the costs of internal travel (US$ 1,500).

Project Title: Assistance to the Industrial Projects Department (IPD), Ministry of Industry — Project No. 17

Project Description

I. Information about the Project

Background Information about the Project and Justification

The Industrial Projects Department, Ministry of Industry, is the Department which is assigned to supervising the implementation of projects. Its main activities belong to the engineering aspects and fall under two main categories:

- Civil works and installation of machinery. This entails preparing the engineering designs and blue prints of some projects, but presently revising the designs prepared by companies which undertake the turnkey implementation of some projects, as well as providing the executing companies with necessary data and information. In addition, it undertakes the supervising and follow-up of execution, to ensure correct and accurate implementation. Industrial Projects Department comprises three Sections, namely: Accountancy (Project Accounts Section), Programming Section and Implementation Section. Realizing the important role of the IPD, the Government of PDRY planned to upgrade the staff in the three Sections, to cope with recent procedures and undertake their tasks efficiently, and to equip the Department with necessary tools and recent references in the field of project engineering and implementation. Needless to say, efficient and capable staff will lead to avoiding mistakes, obstacles and delays in implementing the projects, leading also to time and cost minimization. For this purpose, assistance is called for.

Project Input Requirements

A) Apparatus

- concrete testing apparatus (concrete test gun);
- different measuring apparatus for iron buildings/structures;
- one copying and printing machine for drawings;
- one copying machine for documents and agreements;
- one surveying equipment (theodolite);
- drawing tables and chairs;
- various electrical measuring apparatus. Estimated cost : US$ 35,000.

B) References

- Recent books and magazines in the field of civil and electrical designs;
- Standards and handbooks;
- Different references dealing with procedures of implementation, supervision and control of civil and electrical works.

Estimated cost : US$ 20,000.

C) Fellowships

- One fellowship for 6 months in the field of project cost accounts, (6m/m). Cost US$ 13,200.
- Two fellowships to upgrade civil engineers in the field of preparing and revising designs (for concrete and steel buildings/structures), for 6 months (12 m/m). Cost : US$ 26,400.
- Two fellowships for training and upgrading engineers in supervising and controlling the execution/implementation of industrial projects, for 6 months. Total 12 m/m. Cost US$: 26,400.

Total fellowships 30 m/m. Cost : US$ 66,000.

D) Experts

One expert, with wide experience in industrial project design of 10-15 years, to assist local engineers in revising various designs, durating 24 months. Total 24 m/m). Cost : US$ 192,000

Total Project Cost : US$ 313,000

II. Objectives of the Project

A) Development Objective

Upgrade the technical capability of the Ministry of Industry in the field of project implementation, with the result of more effective performance and leading to time and cost minimization.

B) Immediate Objectives

- Equiping the Department of Industrial Project Implementation with necessary tools, apparatus and references.

- Upgrading the technical staff (engineers/accountants) in the various disciplines related to project implementation (through fellowships).

- Upgrading the current performance (through assistance provided by the expert).

III. Outputs Expected and Subsequent Activities Required

A) Outputs

- The above-mentioned equipment and apparatus.

- Trained personnel in the fields of design revising, industrial project management and accountancy, and supervision of project implementation (through fellowships).

- Instant technical aid (duration of 2 years) in the field of project implementation (provided by the expert).

B) Activities

- Defining precisely and procuring the required equipments, apparatus, books and magazines.

- Defining the appropriate places and institutions (universities, institutes, international or regional training workshops etc.) for the fellowships.

- Nominating the staff to be awarded the fellowships and taking necessary measures for their departure.

- Selecting the appropriate expert and taking measures for his fielding in the PDRY.

IV. Assistance Sought

A) Machinery and Equipment

Providing or financing the costs of the above-mentioned measuring apparatus and other equipment, costing US$ 35,000.

B) References

Books and magazines previously referred to, costing US$ 20,000.

C) Technical Assistance

- Providing or financing the costs of fellowships, costing US$ 66,000.
- Providing or financing the costs of expert and other related costs amounting to US$ 192,000.

Total Project Cost : US$ 313,000.

V. Inputs from the Government

- Providing national counterpart(s).
- Bearing the salaries and fringe benefits of awarded personnel during their stay abroad.

Project Title: Sectoral Study of the Clothing Industry (Apparel Manufacture) Project No. 18

Project Description

I. Information about the Project

Background Information about the Project and Justification

Apparel is manufactured in PDRY by several factories; one belonging to the public sector and three to the private sector, in addition to 4 Co-operatives. The volume of production is small, as compared to increasing demand. Moreover, the types of ready-made clothes produced are limited, out-moded and the specifications/quality is low as compared to the actual demand requirements. Local production suffers from severe competition from imported items, with the result that the volumes of imports exceed the gap betwen the local production capacity and demand.

Local production depends to a great extent on imported tissues, in addition to a small amount of cotton cloth produced locally. The value of imported ready-made clothes and similar items is remarkably high, amounting to 3,474,631 YD in the year 1983, constituting 1.4% of total imports and is rapidly increasing, amounting to about 3,967,250 YD in the first three quarters of 1984, constituting 2% of total imports.

For the purpose of supporting and developing clothing industry, several measures are resorted to, to solve some problems and lead to prompt and instant improvements in the short-run and to reorganize and expand the clothing industry on a sound basis in the long-run. For the short-term/ urgent support, a project is suggested for technical assistance, to improve the performance of some producing firms and Co-operatives. For the long-term radical improvements, the Government has planned to carry out a comprehensive study and a proposal is included in the Third Five Year Plan, to carry out a diagnostic study of the clothing industry.

Technical assistance is required to carry out this study, which has to include: present and anticipated future demand, the existing production capacities of firms and Co-operatives. quality of products, as compared to specifications suiting local demand, inputs needed to upgrade and expand production etc., and concluding to concrete proposals to rebuild and develop the clothing production subsector.

Project Input Requirements

A team of experts:

- Market analyst of high calibre with 10-15 years experience in market analysis and demand forecasts for 2 months (2 m/m).

- A textile expert with experience in the clothing industry, with 10-15 years experience. A broad knowledge for defining various requirements, operating and maintenance of equipment is required, for 6 months (6 m/m).

- An engineer/technician with wide wxperience in designs and standard measures for 3 months (3 m/m).

- Industrial economist with 10-15 years experience in cost assessments, costing and pricing for 6 months (6 m/m).

Total 17 m/m.	US$
Cost	170,000
Other costs	3,000
Total Project Costs	173,000

II. Objectives of the Project

A) Development Objectives

Strengthening the clothing production subsector, to meet the local deamand from ordinary (acceptable) end high quality items, leading to more self-reliance, foreign exchange savings and probable price reductions.

B) Immediate Objectives

Raising the capability of the existing factories (and Co-operatives) producting apparel, to meet the local requirements, proposing additional capacities and recommending new production and other policies.

III. Output Expected and Subsequent Activities Required

A) Output

A detailed report comprising the results of a comprehensive diagnostic study of the clothes production subsector, covering:

- present and anticipated demand, for different market segments;

- the present status and performance of existing production units (public, co-operatives and private);

- the quality of present production, as compared to imports, and to the needs of different level consumers;

- evaluation of productivity, assessment of production costs in the existing firms and Co-operatives and the diagnosis of the defects;

- recommendations to raise the performance of the existing units' replacements needs, additional equipment, standard designs, standard measures, special manpower inputs and marketing activities etc.;

- recommendations for the required additional production capacities to meet the projected future demand, specifying needs for machinery and equipment;

- recommendations as regards needs (the main inputs) from different kinds of tissues (cotton, polyacryl etc.), their suitability, their sources with defining suitable material suiting climatic conditions, local tastes of different levels, and pointing out any necessary changes;

- different policies and measures related to cotton processing vs/ exportation, importantion of different yearn/and/or tissues including import tax and price policies have to be touched;

- recommendations as to other industries that originate from the above proposals with identified project ideas;

- recommendations as regards future needs for training programmes to provide the required numbers of different skills in various processes/ pertinent to clothes production: designing, cutting, tailoring, packing, marketing and maintenance.

B) Activities

- Experts collecting necessary data, examining the existing production units as regards equipment, performance, cost, quality of products etc.

- Marketing expert, assessing present and forecasting future demand for various/different items considering special requirements of various market segments.

- Studying and analysing the results, determining additional equipment and capacities required and related industries etc.
- Consulting with Government officials as regards policy issues.
- Formulating the above-mentioned recommendations.

IV. Assistance Sought

Technical Assistance

- Providing and/or financing experts and other related costs (US$ 173,000).

Total Project Cost : US$ 173,000.

or

- Providing direct financial assistance to cover the expenses of a sub-contract for undertaking the study with the suitable consulting firm.

V. Inputs from the Government

- Providing necessary data.
- Covering expenses for local field visits (equivalent of US$ 1,000.
- Providing suitable local counterparts.
- Consulting with experts whenever necessary

or

- Assigning local staff to prepare terms of reference for the study to be undertaken by consulting firms, revise the interim and final reports.

Project Title: A Study on Packing Materials Project No. 19

Project Description

1. Information on the Project

Since the adoption of comprehensive planning shortly after independence, attention was given to the industrial sector and a high proportion of investment budget was dedicated to industry. As a result, several industries were brought up, and the value of industrial production in the year 1983 was 21.3 million YD, and is expected to reach about 35.6 million YD by the end of the year 1985.

Further, it is anticipated that investments to be allocated to the industrial sector in the TFYP (1986-1990) will exceed 58 m. YD, and the value of production to rise to about 72 million YD at the terminal year.

Various commodities for consumption are now produced, the main items being cigarettes, matches, beverages, tomato paste, diary products, cooking oil, soft drinks, leather and plastic shoes. New projects which are expected to begin production through the years of TFYP (1986-1990) will introduce to the market new commodities and expand production of others such as bear, knitwear .. etc in addition to cement. Wrapping and packing of the products constitute an important element in marketing reflected in the costs. Some packing materials are produced locally. At present paper and plastic bags are produced, and some additional new projects for producing containers, and other packing materials are presently under study, with the aim of producing locally a part of (some) wrapping and packing materials needed for the products of the growing industrial sector and other agricultural products.

Yet studying vastly the various needs of various industries for different possible wrapping and packing material was deemed essential.

A proposal for undertaking an extensive study is included in the TFYP (1986-1990), with the purpose of drawing a master plan for satisfying the demand for packing and wrapping materials through local production considering suitability, convenience, sanitary and trasportation aspects. For this purpose technical and/or finacial assistance is sought.

Project Input Requirements

A team of experts composed of:

- Market analyst, with experience of 7-10 years, for 2 months (2m/m)
- Packing expert with experience of 10-15 years for 4 months (4 m/m)
- Industrial economist with experience of 10-15 years and good knowledge of cost assessments for 6 months (6 m/m)

Total 12 m/m cost = US$ 120,000

Other costs	US$	2,000
Total Project Costs	US$	122,000

II. Objectives of the Project

A) Development Objectives

Strengthening the industrial sector and ensuring integrity among various industrial sub-activities and with other sectors, leading to more self reliance with the possible result of foreign currency saving.

B) Immediate Objectives

Specifying the requirements of existing and new industries and products of other sectors from the appropriate containers and different packing materials, by local production (totally or to the greatest possible extent) making use of available resourses.

III. Outputs Expected and Subsequent Activities Required

A) Outputs

- A detailed master plan, specifying alternative methods for containing, wrapping and packing of different products (paper, plastics, tin, glass --- etc) taking into consideration the volume/quantity and type of product, its end use (domestic/exportation), sanitary (hygenic) considerations, transport facilities and marketing considerations.
- A list of projects for producing packing materials (putting into consideration the capacities of existing firms) and plans of production for the existing firms.
- Appraisal of possible alternative methods for containing, wrapping and packing (in case of the feasibility/appropriateness of more than one method for one and the same product) comparing their costs.

B) Activities

- Collecting data and information about the present and future local production of different commodities, and capacities of firms producing packing materials, as well as those of projects under study.
- Undertaking various analyses and studies to identify and select suitable methods of paking.
- Defining expansions or new projects to produce packing, and sorting up production plans for existing firms and new projects.
- Undertaking cost estimations and appraisals for proposed packing methods/ materials, comparing alternatives if present.

IV. Assistance Sought

Technical and/or financial assistance

- Providing and/or financing the costs of experts and other costs amounting to US$ 122,000

Total cost - US$ 122,000

V. Inputs from the Government

- Providing necessary data
- Covering the expenses of local field visits
- Providing suitable counterparts

OR

- Assigning local staff to prepare the terms of reference for the study, revise the interim and final reports.

Project Title: Establishment of Industrial Areas in Peoples Democratic Republic of Yemen — Project No. 20

Project Description

1. Information on the Project

Background Information about the Project and Justification

The Government of PDRY is planning to establish four industrial areas in different governorates to settle new projects, well designed for the requirements of various industrial activities, and equipped with necessary infrastructural facilities and services. For this purpose, a project idea is proposed in the TFYP (1986-1990) implying a study to decide upon the suitable areas and provide necessary designs and implementation plans. Technical and/or financial assistance is called for to help undertaking a comprehensive two-phase study as described below.

Project Input Requirements

Phase I

- An Industrial Planning expert with past experience of 10-15 years, for 3 months (3 m/m)

Cost	US$ 30,000
Other expenses	US$ 2,000
Total	US$ 32,000

Phase II (Provisional)

- An architect, with 10-15 years experience in town planning, with background knowledge in industrial building for 3 months, (3 m/m).
- Three Technical assistants: surveyors and draftsmen for 3 months (9 m/m).
- Four Industrial engineers specialised in: agro allied, chemical, basic metallic and mechanical industries, for 2 months (8 m/m).

Cost	US$
Architect and engineers (11 m/m)	110,000
Technicians (9 m/m)	18,000
Other costs	5,000
Total Phase II	133,000

Total Project Costs

Phase I	32,000
Phase II	133,000
Total	165,000

II. Objectives of the Project (Phases I and II)

A) Development Objectives

- Supporting the Industrial sector, ensuring the efficiency of new projects through proper locations in well equipped areas.
- Attaining Regional Development targets.

B) Immediate Objectives

Choosing the appropriate locations for future new projects in different governorates as well as preparing the designs of industrial areas and required infrastructure and plans of execution.

III. Outputs Expected and Subsequent Activities Required

A) Outputs

Phase I

A detailed Report comprising:

- The list of different industrial projects and project ideas, their locations in different governorates, their production capacities and a map denoting their spatial distribution.
- The plan of action for Phase II, defining the exact requirements of different industrial engineers and their specializations (according to the types of proposed projects) the architect and technical assistants, and required time and duration.

Phase II

It will define and prepare:

- Additional needs for different infrastructual facilities in different locations (areas): roads, power, fuel, water .. etc), and their estimated costs.
- Maps, architectical/drawings, lay-outs and blue prints of the industrial areas, at different locations, and estimated costs.
- Implementation schedule, denoting time required, and priorities of establishing different areas according to Regional Development Considerations.

B) Activities

Phase I

Conferring with high officials of the Ministry of Planning to identify and discuss:

- Regional planning tartets

- New projects and project ideas proposed for the TFY plan and the following plans.

  Prepare a list of approved projects and proposing project ideas, belonging to different industrial subsectors, denoting their locations and prepare a map of distribution.

  Phase II

- Examining available maps, preparing necessary new maps, and deciding upon the locations.

- Revising the regional distribution of new profits (prepared during Phase I) through joint consultation with high staff members of the Ministry of Planning according to the latest set-up targets for regional development, and carrying out ammendments to the previously prepared distribution whenever necessary.

- Preparing the lay-out of different Industrial Areas and setting-up specifications for industrial buildings according to types, numbers, capacities, locations .. etc; making provisions for future expansions.

- Examining the existing and determining additional infrastructure facilities and services (including sub-ways/sub-roads).

- Estimating the costs of each of the industrial areas including costs of infrastructure.

- Setting priorities and schedules for implementation.

IV. Assistance Sought

Technical and/or financial Assistance

Phase I

- Providing and/or financing the costs of expert and other costs amounting to US$ 32,000 and US$ 133,000 for Phase II as specified under project input requirements.
  Total cost US$ 165.000

V. Inputs from the Government

Phase I

- Providing necessary data, information about new proposed projects/ regional planning targets, government policies priorities etc.

Phase II

- Covering the expenses of local field visits (the equivalent of US$ 2,000).
- Providing suitable counterparts.

OR

- Assigning local staff to prepare the terms of reference for the study, call aids, choose the appropriate firm and revise the interim and final reports.

Project Title: Opportunity Studies for Some New Project Ideas

Project No. 21

Project Description

1. Information about the Project

Background Information about the Project and Justification

Examining the development plan targets, growth rates of different sectors and for the industrial sector in particular, considering the inter-industrial and inter-sectoral relations as well as a quick glance at foreign trade statistics and available resources brings up some ideas for new investment opportunities in addition to those suggested in the TFYP (1985-1990). Most ideas are for projects to produce requirements (inputs) of some existing industries and other sectors from intermediate and capital goods. Simple as they look, they mark a new phase of industrial activity, to produce intermediate and capital goods. A short note of each is given in the following.

Production of Purified (table) salt and Caustic Soda

Salt produced up till now is common, commercial, cooking salt. Production can be expanded, yet it would be better to up-grade the product, to produce more valuable items needed. The proposal is to examine the possibility of:

- establishing a production line for the purification of salt so as to get pure table salt. Access to markets of neighbouring countries has to be tapped.
- establishment of a number of cells for the electrolysis of salt solutions to get sodium hydroxide and chlorine. Present demand for sodium hydroxide is mainly for oil refining but it will increase by the installation of the soap factory (cap. 600 ton of toilet soap and 8,000 ton soap powder). This may justify examining the possibility of establishing a few cells for producing sodium hydroxide. The associated chlorine may be used to produce hydrochloric acid for salt purification and chlorine compounds which can be used for water treatment and other industrial uses.

The Manufacture of Sheet Glass

The building and construction sector is rapidly growing and expansion in housing is anticipated through the following plan periods. Its present requirements for most inputs including glass sheets is satisfied through importation. Satisfying the greatest possible part of the needs from local production is aspired. The possibility of producing glass sheets is not

improbable, as necessary raw materials are most probably available, and a product for producing glass containers is now under study. Attaching a line for producing glass sheets would raise the profitability and serve supplying the building and construction sector with its needs for glass domestically, and would also lead to positive foreign exchange impacts.

Ceramic Tiles and Ceramic Ware for Sanitary Purposes
(for bathroom lavabos etc)

Production of these items would serve the above stated purposes, but depends on ascertaining the availability of suitable raw material (clay) which is believed to be available. The study should concentrate on an actual assessment of raw materials which will be the decisive element.

Pig Iron Pipes and Steel Pipes

Modernization and future development of The Revolution Metal Industries REVOMETAL suggest the technical possibility of producing sewage and steel water pipes domestically. The idea deserves further examination of the technical aspects and local demand. The demand for iron water pipes and its share in the local market has to be estimated putting into consideration competing commodities (p.v.c. pipes).

The Production of Synthetic Fibres

The greater part of clothing/apparel is satisfied by imports and the clothing industry depends mostly on imported tissues, as cotton cloth produced is far below the domestic demand. In addition the general trend of weaving industry is to produce tissues from synthetic fibres totally, or mixed with other natural fibres. The idea proposed for examination is to produce synthetic fibres (e.g. acrylic fibres) by extrusion, using imported granules. Similar (but not identical) processes are carried out at AlGundi Firm, thus the technology will not form a difficulty. Needs for certain appropriate looms can be assessed and the possibility examined. Such a project, if viable, would support the clothing industry and help satisfying the basic needs at a lower national cost.

The Proposed Project

The proposed project drives at carrying out opportunity studies for the above ideas. Small sizes of production units have to be sought whenever possible due to the small market of PDRY, yet it is thought that for the proposed projects small proper sizes may be found. It is also to be noted that a negative result entailing that the idea is not feasible is not less valuable than a positive result.

Project Input Requirements

- Marketing expert 10-15 years experience (preferably) with experience in inter-industrial relations and a background of input-output analysis and profitability analysis for 4 months (4 m/m).
- Chemical engineer specialized in electro chemical industries (7-10 years) for 1 month (1 m/m).
- Chemical engineer(s) specialized in glass and ceramic industries (10 years) for two months (2 m/m).
- An engineer (textile engineer) specialized in synthetic fibre production (7-10 years) for one month (1 m/m).
- Mechanical/metallurgical engineer (7-15 years experience) for one month (2 m/m).

Total : 10 m/m	Cost:	US$ 100,000
Additional Related Costs:		US$ 2,000
Total Project Costs:		US$ 102,000

II. Objectives of the Project

A) Development Objective

Strengthen the Industrial Sector and widening its role in economic activities, to serve other sectors by producing intermediate and capital goods.

B) Immediate Objective

Examine the opportunity for 6 new industries, to detect their viability and select those which seem viable to be subjected to further feasibility studies.

III. Outputs Expected and Subsequent Activities Required

A) Outputs

Six reports, each containing:

- A quick market assessment for the commodity concerned, present and anticipated;
- Required inputs and their availabilities;
- Production capacity of a suggested firm according to market requirements and different available technologies;
- Estimating the approximate capital costs, current costs, revenues on an annual basis;

- Simple profitability measurements: simple rate of return employment effect and capital/labour ratios, foreign currency savings;
- Recommendations as to reject the idea or proceed for further feasibility studies.

B) Activities

- Referring to different available statistics and information.
- Assessing present and forecasting future demand.
- Detecting the availability of raw materials.
- Carrying out the different processes needed to define the capacity, assess capital and current costs, revenues, etc.
- Assess the profitability of using simple criteria on a one year basis.

The market analyst will undertake demand estimations for the 6 commodities and is expected to help in profitability measurements.

IV. Assistance Sought

Technical Assistance

The provision and/or financing the required experts and the related additional costs (US$ 102,000)

Total cost US$ 102,000.

V. Inputs from the Government

- Providing suitable national counterparts.
- Providing available data and statistics.
- Holding necessary meetings for discussion with the experts whenever deemed necessary.

Project Title: A comprehensive study on the Production of Building Materials — Project No. 22

Project Description

I. Information on the Project

Background Information about the Project and Justification

The construction activity in PDRY is progressing since independence and the beginning of planned development. This can be easily perceived by comparing the contribution of the construction sector in the GDP fulfilled at 1981 with that of the year 1973.

	In Million YD		As % share of G.D.P. at Factor Cost	
	1973	1981	1973	1981
At constant 1980 prices	13.0	26.1	8.	14.1
At current prices (YD)	4.3	28.2	5.7	13.9

Construction component forms more than 60% of public investments, in various sectors including housing and amounted to about 310 million YD for the second five year plan (1981-1985), in addition to private construction investments anticipated to be 79 million YD. The construction component will naturally increase with increases of development budgets of the third five plan (1986-1990) and private sector investments, during that period.

Most of materials required for construction are up to the present satisfied by imports. Apart from bricks and stone blocks-cement, iron bars, electrical appliances, water pipes are still imported. High import prices, in addition to high transport costs of materials lead ultimately to increase the investment burden needed for planned development. The PDRY Government is determined to produce some of the construction materials locally, and a plant for producing cement (350,000 tons p.a) is included in the TFYP (1986-1990). The feasibility study for a steel mill plant is carried out presently. In addition, projects to increase the production of gypsum, and to produce electrical wires are proposed. The Government of PDRY looks forward for a comprehensive study, specifying the future needs of the construction sector from various building material, assessing the physical resources, and defining possible means of satisfying the demand through expansion of some ongoing firms (e.g. plastics, cement blocks, wood) as well as new project identifying ideas for new projects. The study has to review previous reports and go deeply and widly to assess the needs for various inputs - including human inputs - available resources (raw materials) in relation to various construction techniques, and finally has to offer recommendations for the possiblity.

Technical aid is sought to help undertaking this study, which forms a prerequisite of sound long-term planning.

Project Input Requirements

- Architect, with considerable experience for 4 months (4 m/m).
- Chemical Engineer, with good experience in processing of non-metallic raw materials (cement, tiles, bricks .. etc)
- Industrial economist with high qualifications and experience for 4 months (4 m/m).
- Assistance of experts in on-going firms in various related industries.
- An experienced industrial economist.

Total 16 m/m cost

Expert fees	US$ 160,000
Other costs	US$ 3,000
Total Project Costs:	US$ 163,000

II. Objectives of the Project

A) Development Objectives

- Supporting and raising the efficiency and capability of the construction activity by producing major inputs locally with the ultimate result of reducing the national costs of construction and consequently the cost of development.
- Strengthening the industrial sector by raising the capacity and widening the scope of industrial activities.

B) Immediate Objectives

- Seeking solutions for problems facing the construction sector and proposing plans for providing most of its requirements locally.

III. Outputs Expected and Subsequent Activities Required

A) Outputs

A report containing:

- A diagnostic study of current problems facing the construction sector as regards the provision of inputs required (e.g. delays due to various reasons).
- Specifying inputs requirements for various types of buildings and construction (roads, industrial buildings, etc and their present sources).

- Various technologies for building a construction leading to raise the efficiency through time (and cost) minimization.
- Raw materials available in PDRY that could be used for producing construction inputs (clays, lime stone, gypsum, volcanic slag .. etc).
- Alternative inputs required for alternative methods of construction and the costs in each.
- Assessing the existing (and planned/future) capacities for producing the essential inputs.
  - proposing new projects to produce construction inputs (from available raw materials, defining their location in the light of regional needs and transportation costs).
  - drafting plans for some existing firms to produce items needed for construction (plastic electrical appliances, steel implements, wires .. etc) defining required items in quality/quantity.
  - assessing the needs for different skilled man-power for construction in relation to alternative construction technologies.
- Assessing and evaluating the financial, economic and national benefits of the above proposals (financial/commercial and national evaluation).

B) Activities

- Recruiting experts or setting up-terms of reference for consultation firms.
- Collecting data and reviewing various previous reports, and information about existing firms producing construction inputs.
- Undertaking diagnosis, analyses and various studies to various components of the study as stated in specifying the outputs.

IV. Assistance Sought

Technical/Financial Assistance:

- Providing and/or financing the costs of experts and other costs or grand as specified under project input requirements.

Total Project Cost US$ 163,000.

V. Inputs from the Goverment

- Providing necessary data.
- Providing transport facilities.
- Providing appropriate counterparts.
- Providing the assistance of local experts in existing firms.
- Assigning local staff to prepare the terms of reference for the study, revise the interim and final reports.

Project No. 23

Rehabilitation and Modernization of Al-Mansoora Textile Mill

Project description

I. Part A. Information on the project

1. Background information about the project and justification.

1.1. Project Status: Yemen Corporation for Manufacturing Textiles.

(YCMT) Al-Mansoora established its Textile Mill in 1975 with Chinese assistance with a nominal capacity of processing 1,000 tonnes of raw cotton. However due to a variety of reasons, the mills performance has been declining in the last years. The current level of production is about 2.5 million metres of 100% cotton woven cloth. The mill produces voile maschada and makrem from long staple indigenous cotton and shirting, drills from medium staple indigenous cotton. In 1981, production was 1.63 million metres of woven cloth the lowest in the history of the mill which has rated capacity of 7.4 million metres. Concerned with this low utilization of the capacity and having identified some basic causes for it, the Government of the PDRY commissioned a study through consultants to investigate causes for declining production, to find solutions to these causes and to investigate technical feasibility and economic viability for expanding production capacities to meet the growing demand for textiles in PDRY. Following reasons have been mentioned by the consultants for low output of the mill:

- Outmoded and inadequate technology
- Low machine efficiency
- Low operative productivity and lack of practical experience in management and supervision
- Inadequate air conditioning.

Specifically, the consultants evaluated the various sections of the mill as follows:

Spinning: Opening, cleaning, carding machines are adequate in quality type and condition. However, the operators need training in setting and operation of these machines. The machines need overhauling. Ring frames require larger rings and pneumatic travelling cleaners.

Yarn Processing: Winding machines are good in reasonable conditions, however mechanical air cleaners are inadequate and pirn winders fall short

of requirements both in capacity and quality. Yarn preparation equipment for coloured yarn is unsuitable.

Weaving: Manual and automatic shuttle changing equipment installed in the factory is completely outmoded. The condition of looms is generally poor. The spare parts are unobtainable and many of the shuttle boxes are broken thus reducing the effectiveness of looms and requiring more labour.

Dyeing and Finishing: Dyeing and finishing machinery is in reasonable condition but capacity is insufficient. The printing machines are slow, crude and inaccurate and need replacement by a modern screen printing machine with a matching dryer.

Buildings: The mill buildings are on the whole well designed and suitable for their purpose. Mill services with the exception of air conditioning are generally well maintained.

Airconditioning: This presents a special urgent problem in spinning and weaving departments. The total air handled by the system is 250,000 cubic feet, half the amount required. Total output of central refrigeration system is 300 T - about one third of the requirement. The plant arrangements by themselves are not satisfactory and heat gain through poor insulation in ducts and in other elements makes the system further less effective. The controls are mostly manual.

1.2. Suggested measures by the Consultant and status of their implementation:

In accordance with the instructions of Ministry of Industry regarding production programmes the Consultants have given a plan for rehabilitations/ modernization of the mill. This programme has to be accomplished in two phases:

Phase I: Improvements in airconditioning system and enhancement of its capacities.

Phase II: Modernization/rehabilitation programme.

Additionally, measures such as house cleaning, upgrading of skills and proper use of equipment and facilities were suggested. The Government has already embarked upon implementation of the measures but needs strong support from sister developing countries particularly in the areas of training in their home countries and technical assistance in maintenance and operation of the mill. Both phases are at the stage of finalization with the suppliers.

1.3. Demand: Past and current consumption for textiles can be derived from production statistics and imports. The fabrics are imported directly by the state enterprise, public Trading Corporation for Textiles and Electric Goods as well as through expatriates returning from Gulf countries. The production of textile fabrics in PDRY can be summarized as follows:

	Million metres
1976-1977	7.65
1978	4.01
1979	2.02
1980	1.82
1981	1.63
1982	2.40

Textiles are imported in two forms, namely ready made garments and piece goods. Piece goods include shirting, screen printed fabrics. voile poplin, suiting, dress fabrics, cardroy, etc. Ready made garments include towels, underwear, bed spreads, children garments, sarongs, school clothes, ladies dresses and blouses, men's suits, trousers, etc. Imports of textile and ready made garments fabrics, in the past have been as follows:

	Fabrics million met	Ready made garments (including blankets, etc. MYD)
1974	15.28	3.23
1975	7.38	2.51
1978	2.37	2.96
1979	4.68	3.29
1980	3.21	6.93
1981	3.61	2.87

Additional indirect imports through Yemeni expatriates returning home and through gifts by these expatriates to their families are substantial. These indirect imports do form substantial part of consumption but cannot be reckoned as available market for PDRY textiles. However these imports can be reduced if local products with good quality and low prices fabrics are available.

Current consumption including imports in all forms can be reckoned at 13.9 million metres expected to reach at 18.0 million metres in 1993. If good quality textiles are produced in PDRY at competitive prices there will be good chances of exports to Gulf countries. Consumption in Gulf countries

is high but the market is very competitive. Other potential markets include Iraq and Libya.

1.4. Plant Capacity: The rehabilitation/modernization programme aims at following product mix and capacities:

Fabric Description	Required production million metres/year of 4170 hours i.e., 2 shift basis
- Voile	3.00
- Makarem	0.28
- Drill	0.30
- Curtaining	1.00
- Bed sheeting	0.30
- Maschada	0.20
- Household	0.50
- Towelling	0.20
Total	5.78

1.5. Availability of raw materials: The main raw material is cotton. The rehabilitation plan does not envisage the use of synthetic or blended fibres. Very fine long staple cotton called K4 and medium staple cotton are grown in the country. K4 cotton is equivalent to the well known Egyptian Giza. PDRY has also been exporting cotton apart from meeting her own requirements. For all the products listed in the production programme, PDRY cotton can amply meet the main raw material requirements. Cotton is planted in 11,000 hectares. Current exports of deseeded cotton are 2,450 tonnes per year in addition to meeting the requirements of existing mill. Requirements for long and medium staple cotton after rehabilitation will be 305 and 501 tonnes respectively.

1.6. Project cost:

For rehabilitation and modernization the costs are estimated as follows:

Al-Mansoora Textile Mill Rehabilitation:
Capital cost summary

	'000 US$ cif
Production machinery and ancillary equipment	10,738
Erection and commissioning production machinery	350
Air conditioning equipment	3,440
Air conditioning installation	860
Spare parts - production machinery	544
Spare parts - mechanical and electrical and air conditioning (two years)	72
Building works - air conditioning buildings and machinery foundations	1,140
Electrical work (other than air conditioning) - equipment	160
- installation	150
Engineering project management services (separate contract basis)	1,392
Port charges, inland transport	452
Pre-operating costs - recruitment and training	500
Contingencies	1,980
Total capital cost	21,778

II. Objectives of the Project

A. Development Objective: To provide good quality clothing to the masses at reasonable costs utilizing indigenous cotton.

B. Immediate Objective: To rehabilitate and modernize the existing Al-Mansoora mill - to increase it productivity - to improve its products quality, to provide healthy working environment for the labour force and to reduce costs of production.

III. Outputs Expected and Activities Required

A. Outputs: A rehabilitated modern textile mill capable of producing quality cotton fabrics at low cost.

B. Activities: The first activity that has to be undertaken is to evaluate the bids and for this the services of textile engineers with extensive experience in management of rehabilitation projects will be required. Next step will be to develop schedules of implementation and to monitor and supervise the various elements of the project including inspection of equipment, inspection and testing of installations, approval and certification and start up of the mill.

Parallel to this, training to mill's personnel shall have to be imparted

- in donor country
- in equipment supplier's country and
- at the mill.

To ensure smooth operation of the mill for two shifts the services of engineers and technicians will be necessary.

IV. Assistance Sought from the Participants

A. Technical Assistance	Time	Cost US$
A-1 A team of advisers or consultants for the evaluation, monitoring as well as supervision of work at site as well as checking manufacturers' drawings, commissioning and start up		400,000
A-2 A team of engineers and technicians for the operation of the plant as follows:		
Spinning master (2)	2 x 18 m/m	300,000
Weaving master (2)	2 x 18 m/m	300,000
Lining master (2)	2 x 18 m/m	300,000
Textile and maintenance engineers (2)	2 x 18 m/m	220,000
Maintenance technicians (3)	3 x 18 m/m	210,000
B. Fellowship and Training - 20 trainees for the period of 6 months each	120 m/m	480,000
Total costs:		1,810,000

V. Inputs from the Government

The Government will provide the following:

1. National counterparts to work with the advisers and experts.
2. Local staff for the operation of the plant.
3. All raw materials, consumables and utilities for the commissioning and proper operation of the plant.

Project No. 24

Gypsum Panels Plant in PDRY

I. Background

1.1. The Government of the People's Democratic Republic has been constantly striving to develop alternative building materials with better properties and available at low cost. Utilization of the indigenous raw material resources in developing such new materials and thus saving foreign exchange remains to be the corner stone of developmental strategy of PDRY. Further, such materials, apart from offering better properties result in cost saving in building construction.

Having recognized the potential of gypsum plaster and gypsum panels as important building materials, the Government of PDRY requested the Government of India for technical assistance through Indian Technical and Economic Co-operation (ITEC) Programme. The scope of assistance was to prepare feasibility study for gypsum panels plant. The study was prepared and submitted in 1984. It deals with establishment of a gypsum panels plant in the vicinity of existing chalk factory in Hadramout governorate of PDRY to cater to the demand for gypsum panels in PDRY. It is also the Goverment's intention and first priority to improve the operation and the quality of product of the existing chalk and gypsum factory.

1.2. Products to be manufactured:

- Non load bearing gypsum partition panels
- Gypsum plaster powder.

1.3. Present and future market:

Gypsum panels are not being used in building construction at present. Based on the government's construction activity, currently going on PDRY, the demand for non load bearing partition panels has been estimated at about 40,000 square metres. Presently these panels are being made out of a number of materials the foremost being hollow cement concrete blocks aerated or non aerated. The demand for panels will rise in proportion to the growth of construction activity.

Considering the conditions of PDRY where due to limitations of foreign exchange the choices to the consumer are rather limited, it is difficult to make an assessment of consumer preference for a new product like gypsum panels.

However, it has popularity in other countries against substitute products, due to its superior thermal and sound resistance, its fire resistance, its superior finish, ease of installation and practically no requirement for plastering before painting.

1.4. Plant capacity:

The consultants have recommended a plant to produce 40,000 square metres per year of gypsum panels and 1,800 tonnes of gypsum powder per year as final products on single shift operation. Gypsum powder will be for local consumption to be used as plaster and as part of mortar. It is also recommended to rehabilitate the existing chalk and gypsum factory. A preliminary list of equipment required for this purpose is attached as Annex I.

1.5. Plant input requirements:

The major raw material for the products under consideration is gypsum stone which is abundantly available. Other requirements are minor and also can be easily met. Annual input requirements are as follows:

- Raw gypsum stone	3,200 tonnes per year
- Electric power	144,000 KWh
- Water	4,500 cubic metres
- Fuel Oil	60 cubic metres
- Diesel Oil	24 cubic metres

1.6. Plant location:

The plant is planned to be located in Ghazi Bawazeer which is 40 km from Mukalla along Mukalla Fuwah Road adjacent to the existing gypsum and chalk factory. The necessary infrastructure and raw materials are available at the selected site.

Alternative and effective strategy to exploit gypsum deposits, in order to reduce the delivered cost of gypsum panels to the consumer and to export the surplus, will be to establish another plant near Aden. This will result in satisfying the requirements for partition panels in Aden and Hadramout governorates and in exporting the products. Details of this strategy will have to be worked out through technical assistance.

1.7. Project cost:

For each plant the costs are estimated as follows:

	Local currency component US$	Foreign currency component US$	Total US$
Fixed Investments 1/			
- Land (10,000 hectares)		assumed free	
- Buildings and civil works	196,520	439,280	635,800
- Machinery and equipment	80,920	780,300	861,220
- Pre operative expenses	72,250	167,620	239,870
	349,690	1,387,200	1,736,890

1.8. Profitability and return on investment:

1- Internal rate of return = 11.58%

2- Pay back period = 5 years and 8 months

3- Break even point = 57.03%

1.9. The cost of equipment for rehabilitation of the existing chalk plant is estimated at US$ 80,000.

II. Objectives of the Project

A. Development Objective: The manufacturing projects for gypsum panels and powder will lead to providing important inputs, at low cost for comfortable housing, thus leading to improvements in living standards of people. Further these will utilize indigenous raw materials for endogenous development and will earn foreign exchange.

B. Immediate objective: The immediate objective of the projects is to establish the manufacture of gypsum panels, as substitute material for non load bearing partition walls for houses, hospitals, schools, offices and similar constructions. These factories will also produce gypsum powder to be used as clean plastering material. Also to improve the operation of existing chalk and gypsum factory.

1/ 1 US$ = 0.346 YD.

III. Outputs and Activities Required

A. Outputs:

1. Proper and smooth running of the production lines related to existing chalk factory.
2. Trained and qualified local personnel for the proper operation and maintenance of the plant.

B. Activities:

1. To review and update the feasibility and other studies in the light of overall development objectives that is to provide least delivered cost gypsum materials at low cost to the consumers at major demand centres and to assess the export potential. Also to review the equipment required for the chalk plant.

2. To assist the Government of PDRY in procurement of equipment related to the chalk factory.

3. To monitor the delivery of various elements of the chalk factory.

4. To start up and commission the plant.

IV. Assistance Sought from Participants

	Time	Cost US$
1. Rehabilitation of existing plant:		
A. Supply of machinery		80,000
B. Technical Assistance:		
- One adviser to review the present studies and to monitor the rehabilitation	15 m/m	120,000
C. Fellowship and training:		
- 1 supervisor for 2 months	2 m/m	8,000
2. New Gypsum Plant Boards:		
In case the result of review and assessment of the studies is positive:		
A. Technical Assistance:		
- A team of experts and operators to help in commissioning and running the plant comprising:		
- One supervisor	18 m/m	108,000
- Two skilled laborers	2 x 12 m/m	48,000
B. Fellowship and training:		
- 2 supervisors for 2 months each	4 m/m	16,000
Total Cost:		380,000

V. Inputs from the Government

The Government will provide the following:

1. National counterparts to work with the advisers.
2. Local staff for the operation of the plant.
3. All raw materials, consumables and utilities for the commissioning and proper operation of the plant.

Annex I

Preliminary List of Equipment for Rehabilitation of Existing Plant

1. Vibrating conveyors, mild steel construction, suitable for conveying 1.5-2.0 tonnes per hour of 25-200 mm size raw gypsum, electrically driven.

2. Impact crusher, mild steel construction, suitable for crushing about 1.5-2.0 tonnes per hour of 200 mm size raw gypsum, complete with electric motor.

3. Fine grinder, suitable for grinding about 2 tonnes per hour of 25 mm size gypsum to fine powder, complete with electric motor, mild steel construction.

4. Cyclone separators suitable for separating about 2 tonnes per hour of fine gypsum powder from the hot air, mild steel construction, fitted with rotary locks at the bottom, complete with accessories.

5. Hot air generator for producing hot air up to about 200°C, complete with air fan of capacity about 300 MM3/hour and oil conveying pump, etc.

6. Laboratory equipment comprising of:
   - Mechanical stirrer, laboratory model
   - 500 ml graduated glass jars with water bath and thermostatic control
   - Standard sieves
   - Andreasen pipette for mechanical analysis
   - Briquette moulds
   - Drying oven range 20° to 300°C (electrically heated)
   - Chemical balance with fractional weight box
   - Weighing balance up to 10 kg
   - Crushing strength testing machine
   - Small gypsum grinder
   - Moisture meter

Project No. 25

Dry Cell Battery Plant

I. Information on the Project

1. Background information:

Dry cell batteries are not manufactured presently in PDRY. Therefore the total requirement is met through imports from various countries such as Japan, China, Singapore, India, etc.

In view of the country's ambitious plans in the development of industry and general living standard, it is felt necessary that a start should be made for local manufacture of dry cells in order to reduce imports of this item, thereby saving the country's foreign exchange, and also to get the benefit of added value for the country. Although most of the raw material required would have to be imported, yet the facility would be useful in developing the skills of the local personnel.

Accordingly, the Government of PDRY requested the Ministry of External Affairs, Government of India, to include the preparation of feasibility study for the manufacture of dry cells within the ITEC programme (Indian Technical and Economic Co-operation). A consultant, National Industrial Development Corporation (NIDC) of New Delhi was commissioned to undertake the preparation of the feasibility study. The study which was submitted in January 1984, examines the technical feasibility and economic viability of setting up a plant for manufacturing dry cell batteries in PDRY.

2. Product to be manufactured:

It is proposed to manufacture the standard type of dry cell R20 (UMI) of zinc-carbon-manganese dioxide of 1.5 volt.

3. Demand:

Due to non availability of adequate data, it has not been possible by the consultant to apply normal methods, such as historical analogy method, the regression method and others in forecasting the demand. Instead the market has been assessed based generally on the requirement of dry cells for the major consumers like torches and transister sets. The consumption norms of dry cells for the consumers have been assumed, keeping in view the trends in the developing countries.

A sample survey for demand assessment was conducted, by the consultant, at Aden. The data collected has been utilized after making suitable adjust-

ments to make it applicable on the country wide basis. Accordingly, the total demand of dry cells was put at 13.2 million/year in 1983.

This figure is comparable to the average import figures which was gathered by the consultant for the last few years as shown below:

	Imports	
Year	No. (000)	Value YD
1979	15,290	442,629
1980	17,420	665,474
1981	9,790	401,852
average	14,166	

The consultant has also analyzed the apparent consumption of dry cells per capita in some countries and devised a norm for PDRY in the following manner.

The consumption for some countries are shown below:

Country	Per capita consumption of dry cells
USA	13
Japan	11
Europe	8
India	1.5
Saudi Arabia	13

The per capita income of PDRY is substantially lower than these countries, except India. Therefore the consumption in PDRY was assumed to be from 5-7 dry cells per capita and accordingly the demand was assessed at 10 - 14 million/ year. Based on these analyses, the consultant placed the demand in 1983 at 12 million of dry cells. Assuming the annual growth rate of 2.6% which is considered a conservative figure (same as population growth) the demand for years 1985 and 1990 was estimated as 12.63 and 14.36 million of dry cells/ year respectively.

This figure covers all the three types of dry cells. From the data collected during samples survey, the proportion of consumption was estimated as:

Type	Consumption per cent of total
Standard R-20 (UMI)	79
Medium R-14 (UM2)	6
Pencil R-6 (UM3)	15

Which indicates that the standard type covers almost 80% of the market.

4. Plant capacity and manufacturing process:

The economic size of plant, for manufacturing dry cells has been gradually increasing. In some countries this exceeds 60 million/year.

In order to make the plant viable, it has been proposed an assembly plant which does not include the integrated operation such as extrusion of zinc cans from callots, the crushing and grinding of the manganese dioxide ore to proper fineness. Under such circumstances, a plant with a capacity of 16 million/year has been proposed, with the initial production equipment to produce about 12 million dry cells/year of type R20 which covers 80% of the market.

5. Plant input requirements:

All major raw materials required for the manufacture of dry cells shall be imported.

Total manpower requirement of the proposed plant is put at 87.

Other inputs required for the operation of the plant which shall be made available locally are: water, compressed air, electricity, LPG.

6. Plant location:

The plant is proposed to be located in the area of Dar Saad along the Dar Saad - Lahej road, near the old Dar Saad town.

7. Total project cost:

The total project cost as estimated by the consultant is outlined below:

	Local currency component US$	Foreign currency component US$	Total US$
- Fixed investment	217,000	900,000	1,117,000
- Land	0	0	0
- Civil works + buildings	164,000	368,000	532,000
- Machinery + equipment	53,000	532,000	585,000
- Working capital	269,000	480,000	749,000
- Pre-operational expenses	56,000	171,000	227,000
- Provision for contingencies (included under each item)	-	-	-
Total	542,000	1,551,000	2,093,000

The capital expenditure has been phased out over a period of 30 months, which is considered a practical time for construction of a plant.

8. Information on profitability and return on investment:

- Debt/equity ratio 1:3
- Interest during construction period 5%
- Interest, long term loan 5%
- Interest, short term loan, working capital 8%
- Average gross return on capital (10 years) 14.1%
- IRR 12.44%
- Pay back period 5 years 4 months
- Break even point 65.64%
- Sensitivity analysis: i) For 10% variation in sales price of dry cells, there will be a change of about 17.5% in average gross return on investment.
  ii) For 10% variation in price of zinc cans, there will be a change of about 0.5% in average gross return on investment.

II. Objectives of the Project

A. Development objectives: The overall development objective of this project is to diversify and strengthen the economic base of PDRY, and to make savings in the foreign exchange through the implementation of import substitute industries and to develop the skills of local personnel.

B. Immediate objectives: The project's immediate objectives are:

1. To achieve the construction and erection of a dry cell battery manufacturing plant, as well as the installation of equipment, commissioning and the start up of the plant in the most effective and efficient manner.
2. To ascertain, that the start up and the commercial running of the plant is carried out in most efficient and proper manner.
3. Build up the skill of local personnel, through training abroad or at site, for the proper, efficient and continuous operation of the plant with minimum participation of expatriate experts.

III. Outputs Expected and Subsequent Activities Required

A. Outputs:

The project aims at producing the following:

1. Project evaluation through appraisal of the techno-economic feasibility study related to the manufacture of dry cell, up date all the data and final report for investment decision.
2. Proper and smooth running of the production line of the plant to enable to produce the designed capacity of 12 million/year of R20 dry cells with the enforced quality control measures.
3. Trained and qualified local personnel for the operation and maintenance of the plant.

B. Activities:

To achieve the outputs listed above, the following activities need to be carried out:

1. Review studies, collect additional information and discuss with concerned authorities and prepare report.
2. Prepare equipment specification, invite manufacturers for supply and erection of equipment and engineering design, analyze bids, make recommendations and award contract.
3. Supervise, monitor and co-ordinate, the construction and erection work.
4. Purchase all raw materials and inputs required for the commissioning and start up of the plant.
5. Recruit local personnel and expatriats for the operation of the plant.
6. Set up a training programme for the local personnel.

IV. Assistance Sought from the Participants

Stage I (pre-investment)	Time	Cost estimate US$
A. One adviser to review all previous reports, collect information, appraise reports, make final report for investment decision	3 m/m	30,000
Stage II (in case the plant is implemented)		
A. Provide technical assistance:		
A.1 Pre-operation stage		
- One adviser for the period of 36 months to assist local staff	36 m/m	300,000

A.2 Operation stage	Time	Cost estimate US$
Comprising of a team of experts and operators to help in the commissioning and operation of the plant and train personnel. To be present at site few months before the start up. The team comprises of:		
- One superintendent for production and head of the team	18 m/m	108,000
- One supervisor of operation	18 m/m	72,000
- Four skilled laborers	4 x .8 m/m	144,000
B. Fellowships and training for locals		
- 3 supervisors for one month each and 3 operators for two months each	9 m/m	36,000
Total cost		690.000

V. Inputs from the Government

The Government will provide the following:

1. National counterparts to work with the adviser during all phases of the project.
2. Local staff for the operation of the plant.
3. All raw materials, consumables and utilities for the commissioning and proper operation of the plant.

Project No. 26

Biscuits and Sweets Plant

I. Information on the Project

1. Background information:

At the moment, there is no local production of biscuits and sweets in PDRY. The whole demand is met through imports from various countries namely from Yemen Arab Republic, which represents a major exporter.

In view of the country's ambitious plans in the development of industry and general living standard and in order to increase the domestic value added and to reduce foreign exchange outgoings through import substituting projects, it was decided that a start should be made on the local manufacturing of these commodities.

The consultant, Messrs. L.H. Manderstom and Partner, Ltd., of England, was commissioned to undertake a study on the establishment of biscuits and sweets manufacturing plant in PDRY. The study, in the form of a feasibility study, which was submitted in June 1984, examines the technical feasibility and economic viability of setting up a plant for making biscuits and sweets in PDRY.

2. Product to be manufactured:

It is proposed to manufacture:

A. Rotary moulded type biscuits such as: Marie, cream sandwich, petit beurre and others.

B. Toffees and various flavours of boiled sweets, hard and filled ones.

3. Demand:

The import figures of biscuits and sweets have been analyzed by the consultant. The apparent per capita consumption was also compared with other countries in the region and abroad. Several norms were set for future projections in the following manner.

Biscuits

The imports of various types of biscuits for the 1978/1981 period are indicated below:

Year	Weight in tonnes	In value YD
1978	1,042	720,000
1979	3,046	2,064,000
1980	2,974	2,465,000
1981	3,407	3,040,000

From import figures, the present size of market for biscuits has been estimated around 3,000 - 3,400 tonnes/year. There are indications that this will increase significantly over the next ten years.

This level of market indicates a per capita consumption across the country of 1.5 - 1.7 kg per person per annum which is considered very low, if compared with other countries such as:

Country	Per capita consumption of biscuits (kg)
Egypt	3.0
Saudi Arabia	5.3
YAR	3.1
UK	7.9

In projecting future demand, three levels have been tested. Low projection assuming that the per capita consumption of 1.7 kg will continue. On the other hand, the high projection assumes that in 1993, the per capita consumption will reach 3.0 kg, the same consumption as in Egypt presently. The medium projection assumes a figure in between which is 2.5 kg per capita in 1993. According to this projection, the demand is expected to reach 4,900 and 6,650 tonnes in years 1988 and 1993 respectively.

From the analysis of the market, it was found that the types of biscuits which represent the bulk of market are:

- Marie biscuits
- Cream sandwich biscuits
- Petit beurre biscuits

Sweets

The consumption level of sweets in many countries is the same as the biscuits consumption. This applies to PDRY as well as indicated from the import figures.

Year	Imports weight (tonnes)	Value in YD
1977	515	N.A
1978	N.A	N.A
1979	2,330	1,442,000
1980	3,114	2,425,000
1981	3,440	2,545,000

The same pattern of consumption, most likely will be kept over the next ten years. Accordingly, in the same manner of biscuits: low, medium and high projections were made.

Varieties of sweets consumed in PDRY are not very wide and this represents as indicated below:

Type of sweet	Market share
- Toffees	50-60%
- Plain boiled sweet	15%
- Filled boiled (honey)	20%
- Fruit gums/jellies	5%
- Others	5%
	100%

4. Plant capacity and manufacturing process:

The plant capacities of 4,000 tonnes per annum of biscuits and 4,000 tonnes per annum of sweets is recommended. This is based on 80% plant efficiency and two shifts operation. The capacities anticipated are:

- Marie	1,600 tonnes/year	Toffee	2,000 tonnes/year
- Vanilla cream sandwich	1,200 tonnes/year	plain boiled	1,000 tonnes/year
- Petit beurre	400 tonnes/year	filled boiled	1,000 tonnes/year
- Cut biscuits	400 tonnes/year		
- Other creamed	400 tonnes/year		
Total	4,000 tonnes/year		4,000 tonnes/year

A semi automatic line for the production of single sweet hard, and semi hard biscuits is recommended. The design of the plant will be in such a manner to allow the maximum versatility of production.

A continuous automatic toffee production line will be provided. Another line of continuous cooker and moulder will produce boiled sweets. The third line will be of traditional batch type with vacuum boiling for producing variety of boiled sweets. It can also produce toffees when necessity arises.

5. Plant input requirements:

The main raw materials required for making biscuits and sweets are flour, sugar, glucose syrup and others. Although most of it is imported, but are readily available locally such as flour and sugar.

The total manpower requirement is about 155. Other inputs required for the operation of the plant, which shall be made available locally are: electricity, steam, water and oil.

6. Plant location:

The plant is proposed to be located at Al-Mansourh, adjacent to the present bread bakery. This site is considered ideal since it is developed and its requirement to large quantity of flour could be procured together with bread bakery.

7. Total project cost:

The total project cost as estimated by the consultant is outlined below:

	Local currency component US$	Foreign currency component US$	Total US$
- Fixed investment	1,300,578	8,881,792	10,182,370
- Land	0	0	0
- Civil work + buildings	1,300,578	2,933,353	4,293,931
- Machinery + equipment	-	5,888,439	5,888,439
- Working capital	794,798	1,531,792	2,326,590
- Pre-operational expenses (included under each item)	-	-	-
- Provision for contingencies (included under each item)	-	-	-
Total	2,095,376	10,413,584	12,508,960

8. Information on profitability and return on investment:

In order to guard against the possibility that foreign competitors might offer reductions in C + F prices in order to compete against the new factory, therefore in the economic analysis, the ex-factory prices have been set up 20% below the current C + F price.

- Internal rate of return IRR 37%
- Pay back period 3 years
- Value added (the 5th year) US$ 38,730 per employee
- Break even point 58%

Sources of finance as follows:

- Equity 50% fixed investment
- Loan 50% fixed investment plus working capital

Sensitivity tests	IRR
i) - Capital costs	
+ 10%	34%
+ 20%	31%
ii) - Raw materials costs	
+ 10%	32%
+ 20%	21%
iii) - Sales revenue	
+ 10%	26%
+ 20%	14%

II. Objectives of the Project:

A. Development objectives: The overall development objective of this project is to diversify and strengthen the economic base of PDRY, and to make savings in the foreign exchange and increase the domestic value added in the implementation of import substitute industries.

B. Immediate objectives: The project's immediate objectives are:

1. To ascertain that the start up, and the commercial running of a biscuit and sweets plant is carried out in the most efficient and proper manner and that the products are readily available.
2. Build up the skill of local personnel, through training abroad or at site, for the proper, efficient and continuous operation of the plant, with minimum participation of expatriate experts.

III. Outputs Expected and Subsequent Activities Required

A. Outputs:

The project aims at producing the following:

1. An agreement with a suitable foreign collaborator for the supply of process know-how and technological documents required for the operation of the plant.
2. Proper and smooth running of the production lines related to biscuits and sweets to enable to produce the designed capacity of the quality similar to the present imported one.
3. Trained and qualified local personnel for the proper operation and maintenance of the plant.

B Activities:

To achieve the outputs listed above, the following activities need to be carried out:

1. Prepare terms of reference, invite foreign collaborators for the supply of technical know-how and documentation, analyze offers, make recommendation and award.
2. Make appropriate arrangements, and purchase all raw materials and inputs required for the proper commissioning and start up of the plant.
3. Recruit local personnel and expatriats for the operation of the plant.
4. Set up a training programme for the local personnel at site and abroad.
5. Set up procedures for testing and taking over the plant from contractors.

IV. Assistance Sought from the Participants:

	Time	Cost estimate US$
A. Technical assistance		
A.1 Commissioning and taking over the plant:		
A team of experts consisting of 2 experts to commission and take over the plant. One expert to be present earlier for the mobilization of start up. Details to be agreed at a later stage.	12 m/m	120,000
A.2 Operation stage:		
Two experts to help in the commercial operation of the plant for the period of one year	24 m/m	200,000
A.3 Supply of technical know-how		100,000
B. Fellowships and training for locals		
- Technical Manager (1)		
- Production Manager (1)		
- Chief Engineer (1)		
- Quality Control Manager (1)		
- Technicians (2)	20 m/m	80,000
Total Cost		500.000

IV. Inputs from the Government

The Government will provide the following:

1. National counterparts to work with the advisers during the commissioning and handing over period.
2. Local staff for the operation and maintenance of the complex.
3. All raw materials, consumables and utilities for the commissioning and proper running of the plant.

Project No. 27

Edible Oil Industry

I. Information on the Project

1. Background information:

Toward the implementation of import substitute projects, oil mills were established in PDRY.

The installation of Al Kod factory, which was a gift from the North Korean Government, was completed in 1976. The rated capacity of the mill is 30 t/24 hrs of cottonseed by single pressing and 10 t/hrs of sesame seed by double pressing. The factory comprises of a refinery as well. Due to some difficulties which were encountered during initial operation, some equipment were replaced and the plant was commissioned in 1978. Again numerous problems were encountered in seed intake, cleaning of the seed, the decortication and separation of the cottonseed meats and hulls and the refinery. Therefore after commissioning, the mill was shut down and has not worked since.

The Al Mansurah factory started operating in 1979 and has since processed black cottonseed. Also small quantities of sesame seed were crushed.

The equipment are of East German origin with the following rated capacities:

(a) 40 t/24 hrs of delinted cottonseed

(b) 20 t/24 hrs of sesame seed.

Although cottonseed oil sold by the factory is being highly subsidized, the operation has been carrying losses, a contributing factor to this situation being the limited availability of cottonseed due to decline of the cotton sector.

Under such circumstances, it was necessary to conduct a study on the vegetable oil industry in the PDRY. Such study to aim the evaluation of the prospects of rehabilitating Al Kod factory which remained idle since its completion, and of improving the operations of Al Mansurah factory which is carrying losses. Also to assess the viability of setting up a new edible vegetable oil and ghee production units in order to substitute the imports of these commodities. The consultant Messrs. L.H. Manderstom and Partner, Ltd., of England, was entrusted by the Ministry of Industry of PDRY, to undertake such a study. The study in the form of feasibility study which was submitted in July 1984, examines the technical feasibility and economic viability of vegetable oil industry in the PDRY, embracing the production of cooking oil, by-product oil cakes and vegetable ghee.

2. Product to be manufactured:

Cooking vegetable oil and ghee from the imported crude soyabean, rapeseed oils and RBD (refined, bleached and deoderised) palm oil. Apart of processing and refining the locally available cottonseed and the imported sesame seed.

3. Demand:

The home consumption of imported vegetable fats has been as follows:

Year	All liquid oil (tonnes)	Hydrogenated fats (tonnes)	Total (tonnes)
1978-1981 (average)	4,600	14,100	18,700
1979-1982 "	5,200	12,500	17,700
1980-1982 "	6,700	12,700	19,400
1983 contracts	13,300	9,400	22,700

It can be deduced that the present consumption of all imported vegetable fats in PDRY is around 18,500 - 19,000 tonnes per annum (t. pa).

The home consumption of sesame seed is estimated at 8,000 t. pa. With a probable average yield of 38%, about 3,000 t. pa of sesame oil are released by the traditional oil crushing sector. As the availability of locally refined cottonseed was very limited, almost negligible, then it can be said that the total consumption of all edible vegetable oils and fats is thus about 22,000 t. pa corresponding to 10.7 kg per capita (9.2 kg if sesame oil is excluded). This is comparable to the levels in Sudan (10 kg) and in Egypt (13 kg).

The growth rate of total consumption of vegetable oils and fats excluding sesame oil, for year 1979-1983 has been in the order to 3.3% per annum. This is somewhat higher than that of the population 2.6% per annum.

Applying straight line extrapolation, then the demand forecasts for the next ten years will be as:

1990	22,600 tonnes per annum
1994	26,000 tonnes per annum

The ratio of ghee to liquid oil has been decreasing during the past five years in PDRY. As the true cost of production of hydrogenated vegetable oils will tend to increase due to higher cost of energy, in addition to dietary considerations which will make the downward trend more pronounced. In view of these factors, the demand of liquid oil and ghee for 1994 has been assumed as:

Liquid oil	14,000 tonnes per annum
Ghee	12,000 tonnes per annum
Total	26,000 tonnes per annum

With regard to sesame oil, it is assumed that the present estimated home consumption of sesame seed of 8,000 t. pa, liberating about 3,000 t.pa oil, is likely to remain static over the coming years.

The demand for oil cakes by the same year 1993/1994 is expected to reach 15,000 t.pa. A substantial portion could be made up of sesame cake and cotton seed cake, if the cotton sector is rehabilitated.

4. Plant capacity and manufacturing process:

A. Al Kod factory is located in the immediate vicinity of Abyan Ginnery, therefore it is reasonable to consider the rehabilitation of its cotton seed processing equipment, assuming that the output of long staple seed cotton will gradually increase to reach by 1990 around 30 million pounds per annum, thus releasing annually some 8,000 tonnes of black cottonseed for processing. The crude oil produced to be transported by road tanker to Al Mansurah factory for refining. Since the plant has been idle for several years, the plant requires a detailed examination of the machinery and equipment before deciding precisely which items can be used in such a manner to enable to process up to 50 tonnes per day of whole cottonseed.

With regard to Al Mansurah factory it is suggested, with a modest modification, to process sesame seed by double expelling of 20 tonnes per day. Accordingly the factory has to be given a quota of sesame of 4,000 tonnes per annum. Furthermore, the Al Mansurah factory will refine crude cottonseed oil from Al Kod factory should this be rehabilitated and cottonseed be available in sufficient quantities.

B. With regard to new vegetable oil and ghee plant, consideration has been given to refining of imported selected crude vegetable oils. Part of the product to be packed as cooking oil and the balance to be processed into vegetable ghee. A physical refining with a flexible pre-treatment section to cope with a variety of vegetable oil grades and quantities depending on market opportunities is suggested. Hydrogen generation is based on water electrolysis. Several capacity options have been analyzed in order to cope the projected demand by 1993/1994. The option based on production of 14,000 t.pa oil and 12,000 t.pa ghee has been analyzed in detail.

5. Plant input requirements:

5.1 Raw materials

A. The rehabilitation of Al Kod factory is dependent on the rehabilitation of cotton growing sector in PDRY in such a manner to be able to releast locally about 8,000 tonnes of black cotton seed annually by 1990. Because below this level the crushing operation, suggested would not be viable depending primarily on the true cost of cotton seed.

The Al Mansurah factory requirements are 4,000 tonnes per annum of imported sesame and the product of Al Kod factory.

B. The new plant, with due consideration to world price and availability of crude oils, the most appropriate choice of vegetable oils to be imported to PDRY would be palm, rapeseed, and soya bean oils. But due to problems involved in importing crude palm oil in large quantities, the import of RBD palm oil and possibly some crude quantities are considered.

The importation of oil seeds to be crushed or solvent to reach the target tonnage of 26,000 t.pa has been excluded due to limitation of Aden harbours. This would entail for example importation of about 140,000 t.pa of soyabeans and producing tens of thousands of oil cakes which have to be exported.

5.2 Manpower

Al Mansurah factory employs presently 106 persons. It is not anticipated to increase the staff when the improvement plan is implemented. In case the Al Kod rehabilitation is executed, the number of persons to be employed would be around 90-95 as the refining operation would be dispersed of. The integrated vegetable oil and ghee plant would employ about 263 persons.

6. Plant location:

A new vegetable oil refinery and ghee plant is proposed to be located within the existing site of Al Mansurah vegetable oil factory. This site is well developed and close to the port.

7. Total project cost

7.1 Rehabilitation of Al Kod factory

	Local currency component US$	Foreign currency component US$	Total US$
- Fixed investment	100,000	448,000	548,000
- Land	-	-	-
- Civil work and buildings	100,000	-	100,000
- Machinery and equipment	-	448,000	448,000
- Working capital	436,000	-	436,000
- Pre-operational expenses	-	-	-
- Provision for contingencies (including erection)	212,000	52,000	264,000
Total excluding working capital	212,000	500,000	712,000
Total including working capital	748,000	500,000	1,248,000

7.2 Improving the operation of Al Mansurah

	Local currency component US$	Foreign currency component US$	Total US$
- Fixed investment	52,000	148,000	200,000
- Land	-	-	-
- Civil workers and buildings	30,000	-	30,000
- Machinery and equipment	22,000	148,000	170,000
- Working capital	1,864,000	-	1,864,000
- Pre-operational expenses	-	-	-
- Provision for contingencies (including erection)	3,000	17,000	20,000
Total excluding working capital	55,000	165,000	220,000
Total including working capital	1,919,000	165,000	2,084,000

7.3. New vegetable oil refinery and ghee plant

	Local currency component US$	Foreign Currency component US$	Total US$
- Fixed investment	2,888,000	6,263,000	9,151,000
- Land	0	0	0
- Civil works and buildings	2,338,000	-	2,338,000
- Machinery and equipment	550,000	6,263,000	6,813,000
- Working capital	8,353,000	-	8,353,000
- Pre-operational expenses	-	-	-
- Provision for contingencies (included under each item)	-	-	-
Total excluding working capital	2,888,000	6,263,000	9,151,000
Total including working capital	11,241,000	6,263,000	17,504,000

8. Information on profitability and return on investment

The rehabilitation projects can be seen as firstly, the attempt to utilize more efficiently existing capacity within the country. In order to make the proposed new refinery and hydrogenation plant justifiable, it is desirable that it should be able to produce the commodity at no higher cost than the present import cost.

In carrying out the evaluation, therefore a pricing structure as close as possible to international values measured as the CIF Aden price for traded goods has been adopted.

8.1. Rehabilitation of Al Kod factory

If adequate supplies of cotton seed are available, then the fact that the rehabilitation enables the use of unutilized plant and that net foreign exchange impact is positive. Assuming the operation starts in 1988 with 5,000 t. pa cotton seeds then the return are:

IRR 1.64% with working capital
8.8 % without working capital

which indicates very poor performance. If it is implemented, several concessions have to be made with regard to production tax and the price of crude oil sold to Al Mansurah. In any case the rehabilitation should be considered in 1987 in view of the development of cotton sector in PDRY.

8.2. Improving the operation of Al Mansurah

The rehabilitation and diversification of Al Mansurah is justified so long as there is sufficient throughput of sesame (and cotton seed oil) to cover operating costs. A reduction in throughput over the project's 10 year life of 50% would yield revenues of YD 1,286,000 by 1989, and an overall IRR of 17%.

Even if the rehabilitation of Al Kod is not carried out, and Al Mansurah process sesame only, the project still shows a very high rate of return at 51%. Sensitivity tests show that this project is vulnerable to reduction in revenue or increases in the cost of sesame seed. The cotton oil refining forms only a relatively small part of the business.

	Sensitivity		IRR
(i)	Reduction in sales revenue		
	- 10%		15.1
	- 20%		negative
(ii)	Increases in raw materials costs		
	- Sesame	+ 10%	34.6
		+ 20%	13.4
	- Cotton seed oil	+ 10%	51.6
		+ 20%	50.0

8.3. New vegetable oil refinery and ghee plant

The rate of return for an integrated complex as proposed yields a negative one. On the grounds of foreign exchange costs and benefits, such a project would give a recurrent loss over its life period.

Also with other options, a refinery standing on its own, with vegetable ghee being imported, or an independent vegetable ghee unit, would yield a negative IRR. Therefore the proposal is not recommended for implementation.

II. Objectives of the Project:

A. Development objectives: The overall development objective of this project is to diversify and strengthen the economic base of PDRY and to make savings in the foreign exchange, by utilizing local raw materials through the rehabilitation of idle units and improving the operation of existing units.

B. Immediate objectives: The project's immediate objectives are:

1. To ascertain the rehabilitation of the existing Al Kod factory which remained idle since its completion.

2. To ascertain the operation of the existing Al Mansurah factory in the most efficient and proper manner with commercially acceptable returns.
3. Assess the viability of setting up new production units for edible vegetable oil and ghee to substitute the imports and meet the demand for the next 10 years.
4. Build up the skill of local personnel through training abroad or at site for the proper, efficient and continuous operation of the plants with minimum participation of expatriate staff.

III. Outputs Expected and Subsequent Activities Required

A. Outputs

The project aims at producing the following:

1. Proper and efficient running of Al Kod factory utilizing most of the existing facilities.
2. Improve the operation of existing Al Mansurah factory with minimum additional investment.
3. Effective establishment of a production unit for edible vegetable oil and ghee.
4. Trained and qualified local personnel for the proper operation and maintenance of the plants.

B. Activities:

To achieve the outputs listed above, the following activities need to be carried out:

1. Review studies, collect additional information and prepare report for investment decision related to new vegetable oil refinery and ghee plant.
2. Make necessary preparations with regard to the operation of Al Kod factory in 1988 with due consideration to the availability of the required amount of cotton seed.
3. Assess precisely the new equipment for Al Mansurah factory, prepare specifications, invite suppliers, analyze the bids, make recommendation.
4. Set up training programme for the local personnel.

IV. Assistance Sought from the Participants:

	Time	Cost estimate US$
A. Supply of machinery and equipment (Al Mansurah plant only)		165,000
B. Provide technical assistance		
- One adviser for the period of 2 years to assist in carrying out above activities and to be stationed in Al Mansurah plant	24 m/m	200,000
C. Fellowships and training for locals		
- Quality control head		
- Press room technicians		
- Refinery technician		
- Maintenance	15 m/m	60,000
Total		425,000

V. Inputs from the Government

The Government will provide the following:

1. National counterparts to work with the adviser.
2. Local staff for the operation and maintenance of Al Mansurah plant.
3. All raw materials, consumables and utilities for the efficient running of Al Mansurah plant.

Project No. 28

Vocational Training Centre

I. Information on the Project

The Public Corporation for Electric Power (PCEP), is a state enterprise responsible for the construction and operation of the principal generating installations, transmission and distribution systems in PDRY. Although the implementation of some rural electrification projects, and the operation of some small installations in isolated areas, are presently entrusted to local authorities, but once these projects are completed, and connected to the national networks, eventually, it will become under the responsibility of PCEP.

The following facilities are presently or upon completion operated by PCEP.

1. Al Mansoura diesel power station, Aden: comprises of 8 x 8.16 MW units.
2. Khormaksar diesel power station, Aden: the new station comprises of 5 x 5 MW units plus 8 x 2 MW units, in addition to 2 MW available from units of old station.
3. Hedjuff power station, Aden: comprising of 3 x 5 MW steam turbine units, 2 x 5 MW gas turbine units and 2 x 2.7 MW gas turbine units.
4. Towali diesel power station, Aden: comprises of 2 x 0.8 MW units.
5. Hiswa complex, Aden: comprises of 2 x 25 MW steam generating units, water desalination plant and central maintenance workshop. The first unit is expected to be commissioned in 1986/1987.
6. Mukalla diesel power station - Hadhramout: comprises of 5 x 2.5 MW units.
7. Seyoun diesel power station - Hadhramout: comprises of 4 x 4 MW units.
8. Shahr diesel power station - Hadhramout: to replace several stations of small units. Comprises of 3 x 2 MW units.
9. Diesel stations in Kiaar, Modia and Zoader - Abian: comprises of 7 units of total capacity of 10.2 MW.
10. Small diesel units in various parts of the country: about 46 units of total capacity of 8 MW.
11. Network of MV distribution, all over the country, comprising of 33 KV and 11 KV, partially underground cables.

12. The low voltage network, 240 - 415 V, all over the country.
13. Several projects of 33 KV, 11 KV networks as well as rural electrification, which are under construction either by PCEP or by independent units attached to different governorates.
14. Many other small projects related to rural electrification, are planned to be implemented by PCEP.

In addition to operation of these facilities, the recruitment training and upgrading of the staff related to these projects and others, is the responsibility of PCEP.

The total workforce of PCEP in 1981 amounted to 1900. This number will increase substantially when Hiswa complex and other rural electrification are put into operation.

The manpower requirement of Hiswa complex is expected to be:

Power station	252 employees
Desalination plant	138 employees
Centralized maintenance workshop	83 employees
Total	473 employees

Out of total only 60 are in administration, the remaining are engineers, technicians, skilled and semi-skilled laborers.

With regard to one of the rural electrification projects which is related to "five towns East of Mukkala Project", the total manpower requirement is estimated at about 107 employees, out of which 90 employees are engineers, technicians, skilled and semi-skilled laborers.

Bearing all these in mind, a small training centre was installed at the site of Al Mansoura Power Station, including essentially a mechanical and an electrical section. But the training capacity is very limited and it is estimated that only 60 trainees have followed courses, since the opening of the establishment. The constraint has been mainly shortage of teaching facilities and experienced staff.

Therefore due to this low potentiality for training, it was decided to conduct an overall study for the purpose of establishing a new training centre and setting up a training system to fit the requirements of PCEP.

The Electricité de France, through the French Technical Assistance Agencies, at the Ministries of External Relations and External Commerce,

was entrusted to conduct a study incorporating the analysis of training requirements of electric power sector in the country and prepare an operational feasibility study. The feasibility study was submitted in August 1983 and alternatives for implementation in December 1983.

The basic conclusions and recommendations of the study are summarized below:

1. The analysis of PCEP labour force has shown a serious shortage of senior staff and technical levels.

As a result of an actual field survey, it was estimated that:

- Senior staff (engineers and senior officers) represents only 2.5% of the total workforce of PCEP
- Intermediate technical and administration staff and confirmed technicians represent of about 10% of the total workforce of PCEP.

These percentages in an enterprise like PCEP, are supposed to be of:

- Senior staff 5 - 8 or 10%
- Technicians 20 - 30%

Similar shortages have been noticed at skilled and semi-skilled labour levels, and these shortages undoubtedly will grow up when starting new projects.

2. On the other hand the professional qualification of personnel, at various levels of activities which are related to operation, maintenance and management of PCEP facilities are not considered to be to the standard if compared to the requirement of similar projects.

A large mass of employees without qualifications are found, particularly in the inland facilities. This leading to somewhat chancy running of the power generating and distribution schemes.

3. It has been observed that presently operated vocational training schools and centres in the country are regarded as a good basic technical training adequately designed to give way further specialized courses for upgrading at the level of craftsmanship. Their curricula are far from being sufficient to reach the minimum qualification required for new recruits of the electric power sector. Consequently there is an important gap between the level reached by the trainee at the end of the basic technical training (for example, 2nd year of vocational school or even end of term of technical education bracket) and the qualification necessitated for taking jobs at PCEP.

4. In view of the above it is recommended to initiate as soon as possible a "Crash Programme" for training of the in-service personnel of PCEP in the fields of diesel generation, rural electrification and steam generation. At the same time, and due to limited potentiality of the existing Al Mansoura training centre, it is also recommended to set up a new training centre in Hiswa with the total number of trainees of 90 in order to fill the gap in providing appropriate specialized technical training for the specific changing needs of PCEP. The Al Mansoura training centre however, could be rehabilitated in such a manner to provide urgent and pressing training with a reasonable time.

5. An implementation plan has been submitted by EDF. This plan covers several stages, namely:

Stage I - Crash programme: (1) Al Mansour power station, in relation to diesel power generation and rural electrification. After completion of Hiswa training centre, this will be converted into a training unit for induction and refreshe' courses. (2) At Hiswa power station, in relation with steam power generation.

Stage II - Hiswa Training Centre: Minimum setting of teaching premises, equipment, technical assistance and fellowships for local staff.

Stage III - Hiswa Training Centre: Complementary setting of the centre with respect to premises, equipment, technical assistance and fellowships of local staff.

Optional Stage - Hiswa Training Centre: Supplementary teaching equipment for highly specialized training in power generation.

6. The total cost of the project, according to the above plan of implementation, was estimated by EDF (as of August 1983) at US$ 6,592 million. The operational expenses covering for 4 years cycle. The breakdown cost is detailed below:

Stages in (000) of US$

Item	I	II	III	Optional	Total
1. Teaching equipment	495	739	501.3	625	2,360.3
2. Foreign assistance, technical assistance	621.5	347	347	168	1,483.5
3. Construction of teaching premises	142.8	1,465.8	871.2	30	2,509.8
4. Contingencies 5% of (1-3)	31.7	108.2	68.5	30	238.4
Total	1,291.0	2,660.0	1,788.0	853	6,592.0

II. Objectives of the Project:

A. Development objectives: The overall development objective of this project is to build up the appropriate institutional infrastructure required for the development and upgrading of national capabilities, in particular to cover continuously the training requirements for the staff of PCEP and other electricity entities in the Governorates of PDRY in the branches of power generation, transmission, distribution and utility work in such a manner to fill adequately the gap between the national education system and the job requirements of these operation branches.

B. Immediate objectives: The immediate objective of the project is to assist the PCEP in strengthening and upgrading staff capacities. Specifically the objectives fall into the following areas:

1. Crash Programme training courses for semi-skilled laborers, young technicians or junior engineers and semi-literate staff of PCEP.
2. Reinforce the basic technical training of the school leavers, then give them access to specialization training relating to the various trades of the power generation and distribution branches.
3. Perform "induction courses" for new employees right from the labour market, adapting them to levels of education and previous performance of the newcomers. Also performs "professional induction" for junior engineers.
4. Improve the capability of permanent staff through refresher, upgrading and high-grade specializing courses.

III. Outputs Expected and Subsequent Activities Required

A. Outputs

The outputs expected from the project which are related to professional fields are:

1. General education and basic vocational training.
2. Rural electrification and power distribution trades.
3. Cable jointing trade.
4. Steam and diesel power station operation, and electrical and mechanical maintenance.

B. Activities

To achieve the outputs above, the following activities will be required:

1. Training courses for newcomers; six month basic training, immediately followed by a 12 month specializing training in the various branches of power generation and distribution.

2. Refresher courses for semi-skilled laborers repeat themselves all along the year in sequences of 6 month courses.
3. Induction, upgrading and specialized courses and repeating these courses all along the year in sequences of 3 month intervals.

IV. Assistance Sought

Stage I	Time	Cost Estimate US$
A. Machinery and equipment (Annex I)		410,000
B. Technical Assistance		
1. One specialist in project preparation, evaluation, implementation	24 m/m	200,000
2. Team of training advisers comprising of:		
- one diesel generation	24 m/m	200,000
- one distribution	24 m/m	200,000
- one steam generation (2 terms)	2 x 3 m/m	160,000
- one power generation assistant adviser	14 m/m	120,000
C. Fellowship and training of local counterparts		
- co-ordination engineer	1 m/m	4,500
- three teachers each 3.5 months	3 x 3.5 m/m	52,000
Stage II		
A. Machinery and equipment (Annex I)		410,000
B. Technical Assistance (continuation of team of training advisers)		
- one diesel generation	12 m/m	100,000
- one distribution	12 m/m	100,000
- one steam generation	3 m/m	30,000
- one power generation assistant	14 m/m	120,000
- one distribution assistant	14 m/m	120,000
C. Fellowship and training of local counterparts		
- two teachers each 3.5 months	2 x 3.5 m/m	31,500

	Stage III	Time	Cost Estimate US$
A.	Machinery and equipment (Annex I)		265,000
B.	Technical Assistance (continuation of team training advisers)		
	- one diesel engine	12 m/m	100,000
	- one distribution	12 m/m	100,000
	- one steam generation	3 m/m	30,000
	- one power generation assistant	14 m/m	120,000
	- one distribution assistant	14 m/m	120,000
C.	Fellowship and training of local counterparts		
	- two teachers each 3.5 months	2 x 3.5 m/m	31,000
	Optional Stage		
A.	Machinery and equipment (Annex I)		430,000
B.	Technical Assistance: teams comprising of:		
	- one diesel engine trainer	12 m/m	100,000
	- one diesel engine simulator admin.	3 m/m	30,000
	Total Cost		3,584.000

V. Inputs from Government

The Government will provide the following:

1. All teaching, administration and other buildings required for the Training Centre. It is estimated that the total building area required exceeds 4,000 sq. metres.
2. Some equipment such as PCEP type of poles, cross arms, insulators, transformers, recuperated diesel engine and others.
3. Consumable materials needed for the running of training courses.
4. Local counterparts comprising of:
   - one programme co-ordinator
   - three teachers
   - two assistant teachers
   - supporting staff (administrator, accountants, etc.).
5. Transportation means comprising of one bus and one service station wagon.

Annex I

Machinery and Equipment

Stage I

1. Teaching equipment common to all programmes

1.1 Electrotechnical laboratory
(minimum allotment including experimental panel board)

1.2 Electrical measurements and tests laboratory

2. Diesel power generation section

2.1 Experimental teaching sets and audio-visual aids (diesel engine)

2.2 Draughting room

2.3 Basic mechanical work

2.4 Diesel maintenance, repair and handling workshop

3. Rural electrification section

3.1 Overhead network operation and maintenance shop

3.2 Underground network operation and maintenance shop

3.3 Safety and first aid

3.4 Network operation switchgear and substation workshop

4. Steam power generation section

4.1 Audio-visual equipment:
video-tape recorder, camera, TV and monitoring set, slide projector, retroprojector, tape-recorder, etc.

4.2 Set of video tapes on thermal generation EDF series

4.3 Technical library on thermal generation produced by EDF thermal generation department.

4.4 Experimental teaching sets (various topics on electrical technology)

4.5 Experimental models (boiler, condenser, steam water circuits, etc.)

4.6 Equipment for the electrotechnics and electrical measurements laboratory

4.7 Teaching material specific to EDF on-site training programmes

Stage II

1. Classroom (two in number)

2. Physics, mechanics laboratory

3. Electrotechnical laboratory (complementary equipment)

4. Electrical measurements and tests laboratory

5. Jointing and wiring workshop

6. Maintenance and repair of electrical and mechanical equipment shop

7. General store (spares and materials)

8. Metrology and shaft balancing shop

Stage III

1. Basic mechanical work-fitting, welding and metal-maching (complementary equipment)
2. Diesel power station operation workshop
3. Power station chemistry laboratory
4. Transformer and motor winding shop
5. Switchboard operation and control shop
6. Metering and protection laboratory
7. Model and centre maintenance shop

Optional Stage

1. One diesel engine simulator shop

Project No. 29

Soap and Detergent Complex

I. Information on the Project

1. Background information:

In 1967 an agreement was signed with North Korea for the erection of a plant to produce 500 tonnes/year of toilet soap and 1,000 tonnes/year of laundry soap on a site in Khormaksar. After commissioning the plant in 1969, and limited trial production, the plant was closed down because of inferior quality, limited market of laundry soap, high cost of production and shortage of technicians. Attempts were made to rehabilitate the plant, but the recommendations submitted were not practical in such a way that even after carrying out several modifications, the plant would still be incapable of producing soap to the same quality of imported one.

Meanwhile in the course of investigations which are carried out, in late seventies, on the possibility of establishing a detergent plant, it was found out that the most practical course would be to combine the two projects, soap and detergent particularly as they are closely related from the point of view of marketing and distribution, although they have little in common in terms of production technology. The Ministry of Industry, therefore decided to join forces with the private sector to implement a combined soap and detergent plant with a view of forming a mixed sector company.

The consultant, Messrs. L.H. Manderstom and Partners Ltd., of England was commissioned to undertake a study on the soap and detergent complex and to investigate whether the existing soap plant can be renovated and if so, whether it would be sensible to continue it with a project to manufacture detergents.

A report in the form of a feasibility study was prepared by the consultant and submitted in April 1984.

2. Product to be manufactured:

It is proposed to manufacture detergents of similar formulation to the presently imported brands; toilet soap of the same quality of imported brands and shampoo of different types.

3. Demand:

In order to assess the demand, import and consumption figures have been analyzed by the consultant. Information from different sources were compared.

These sources are:

- Central Statistical Office
- Home Trade Company
- Foreign Trade Company.

Figures thus obtained were corrected by the consultant in such a manner to reflect the actual level of consumption.

Detergents

Based on the information obtained, the picture of detergents consumption appears to be as follows:

Year	Consumption in tonnes
1976	2,971
1977	2,027
1978	3,500
1979	3,403
1980	8,166
1981	9,527

The consumption has risen in 1980 due to lifting of import restrictions. The consumption in PDRY was also compared to the consumption of detergent in other countries and the world per capita consumption.

Assuming the per capita consumption in PDRY is around 4.5 - 5.5 kg and with the present population of 2 million, the overall consumption would be in the region of 9,000 - 11,000 tonnes per year.

From the above analysis, the present overall consumption has been assumed by the consultant at 8,000 tonnes/year. If this consumption increases at the same rate as the population (i.e., 2.6% per year) which is very conservative, then the consumption will be rising to 12,800 tonnes per year by 1995.

Soap

The average consumption of soap for the years 1977 to 1981, according to different sources was put at:

Sources	Average Annual Consumption: 77 - 81 tonnes
- Central Statistics Office	415
- Home Trade Company	547
- Foreign Trade Company	491

Based on the above, the following estimate of demand has been made:

Year	Demand of Toilet Soap (tonnes)
1981	520
1982	540
1983	560
1984	580
1985	600

This reflects the average per capita consumption of about 0.3 kg which is compared to 0.82 kg as the European average consumption of toilet soaps in 1980.

Shampoo

The average import of shampoo for the years 1978 to 1982 is about 100 tonnes per year, as shown below:

Year	Imported Shampoo in tonnes
1978	132
1979	167
1980	75
1981	Nil
1982	150

It is estimated that the demand will double in the next ten years time.

4. Plant capacity and manufacturing process:

The project is considered as a whole comprising of a soap finishing line, with detergent and shampoo production of the following capacities:

- a 3 tonne/hr detergent spray drying plant
- a 1 tonne/hr soap finishing line
- a 1 tonne batch shampoo mixing and bottling line.

The capacities have been recommended in order to have spare capacity available and to avoid operating a third shift.

Because of the size of the market and due to economic reasons, it has been recommended to install a soap finishing line instead of making soap from basic raw materials. For the same reason, the detergent plant is confined only to spray drying without sulphoration plant.

The shampoo line is of such capacity to produce 2 batches/shift so that if a demand for liquid detergents were to develop, it would be able to meet the demand in addition to producing shampoos.

5. Plant input requirements:

The main raw materials required for making soap, detergent and shampoo are soap base, dodecylhenzene, sodium tripolyphosphate and others. Most of it will be imported.

The total manpower requirement of the complex with the operation of spray drying line two shifts will amount to 152. Other inputs required for the operation of the plant which shall be made available locally are: electricity, steam, sodium chloride.

6. Plant location:

The plant is proposed to be located at the existing site of the Korean soap factory in Khormaksar. With regard to the equipment of the existing soap plant, only the soap wrapping machine, the boiler and the water chilling plant, in the value of US$ 100,000, will be utilized. The remainder apart from a few valves, pipes and small vessels would be treated as scrap with negligible commercial value.

On the other hand, almost all the buildings of the existing soap plant will be utilized with some additional work. The value of these buildings has been taken as US$ 1,181,792 and the cost of refurbishment US$ 425,145. Additional buildings and facilities will be required for the proper operation of the complex.

7. Total project cost:

The total project cost as estimated by the consultant is outlined below:

	Local currency component US$	Foreign currency component US$	Total US$
- Fixed investment	2,761,000	4,985,000	7,746,000
- Land	0	0	0
- Civil works and buildings	2,269,000	1,908,000	4,177,000
- Machinery and equipment	492,000	2,990,000	3,482,000
- Vehicles	0	87,000	87,000
- Working capital	2,283,000	0	2,283,000
- Pre-operational expenses	0	434,000	434,000
- Provision for contingencies (included under each item)	-	-	-
Total	5,044,000	5,419,000	10,463,000

8. Information on profitability and return on investment:

In the economic evaluation, the C + F prices have been used in order to demonstrate whether or not the product can be manufactured domestically at less than the economic cost of importing it.

The net present value (at 8%) and IRR of different liens are indicated below:

	NPV US$ 000	IRR
Soap	142	9.7%
Detergent	9,928	31.2%
Shampoo	708	24.7%
Overall project		25.5%

Sources of finance as follows:

- Government grants equity (existing buildings)	40%
- Private grants equity	40%
- Loan	60%

Value added per employee increases from US$ 16,330 to US$ 24,104 per year as capacity utilization increases.

Sensitivity tests		IRR
(i)	Capital losts increase	
	+ 10%	23.1%
	+ 20%	20.1%
(ii)	Selling price falls	
	- 10%	14.4%
	- 20%	2.8%
(iii)	Raw materials cost increase	
	+ 10%	18.2%
	+ 20%	8.0%
Break even point:	Soap line	26%
	Detergent line	29%
	Shampoo	6%

II. Objectives of the Project

A. Development objectives: The overall development objective of this project is to diversify and strengthen the economic base of PDRY, and to make savings in the foreign exchange in the implemr.tation of import substitute industries through direct participation of private sector in the form of mixed sector operation.

B. Immediate objectives: The project's immediate objectives are:

1. To ascertain that the start up, and the commercial running of the soap and detergent complex is carried out in the most proper manner and that the products are of such quality similar to present imported ones.
2. Build up the skill of local personnel, through training abroad or at site, for the proper, efficient and continuous operation of the plant, with minimum participation of expatriate experts.

III. Outputs Expected and Subsequent Activities Required

A. Outputs

The project aims at producing the following:

1. An agreement with a suitable foreign collaborator for the supply of process know-how and technological documents required for the operation of the plant.
2. Proper and smooth running of the production lines related to soap, detergent and shampoo to enable to produce the designed capacity of the quality similar to the present imported one.
3. Trained and qualified local personnel for the proper operation and maintenance of the plant.

B. Activities

To achieve the outputs listed above, the following activities need to be carried out:

1. Prepare terms of reference, invite foreign collaborators for the supply of technical know-how and documentation, analyze offers, make recommendation and award.
2. Make appropriate arrangements and purchase all raw materials and inputs required for the proper commissioning and start up of the plant.
3. Recruit local personnel and expatriats for the operation of the plant.

4. Set up a training programme for the local personnel at site and abroad.
5. Set up procedures for testing and taking over the plant from contractors.

IV. Assistance Sought from the Participants

	Time	Cost Estimate US$
A. Technical assistance		
A.1 Commissioning and take over of the plant:		
- A team of experts comprising of three experts to commission and take over the plant. One expert to be present earlier for the mobilization of start up. Details to be agreed at a later stage.	18 m/m	180,000
A.2 Operation stage:		
- A team of experts to help in the commercial operation of the plant. One of the experts to stay for 1 year and the other for 2 years.	36 m/m	300,000
A.3 Supply of technical know-how		150,000
B. Fellowships and training for locals		
- Technical manager (1)		
- Production manager (2)		
- Chief engineer (1)		
- Quality control manager (1)		
- Foreman (2)		
- Maintenance engineer (2)	40 m/m	160,000
Total Cost		790,000

V. Inputs from the Government

The Government, through the mixed sector company, will provide the following:

1. National counterparts to work with the adviser during the commissioning and handing over period.
2. Local staff for the operation and maintenance of the complex.
3. All raw materials, consumables and utilities for the commissioning and proper running of the plant.

Project No. 30

Accumulator Battery Plant

I. Information on the Project

1. Background information

The Yemen Auto Battery Company Ltd., (YABCO), Aden, presently assembles accumulator batteries from imported parts. Since 1977, as the import of batteries has been stopped, YABCO plant has been the only source for the supply of accumulators. But the plant is facing difficulties to cope with the increasing local demand, dut to high cost of production and poor quality of the battery. Presently the capacity utilization of the plant is only 40% which is producing 22,000 numbers.

Therefore, the PDRY Government has decided to set up a new unit for accumulator batteries in order to meet the growing local demand of the good quality accumulators, and at a lower cost.

Accordingly, the Government of PDRY has requested the Ministry of External Affairs, Government of India, to include the preparation of a feasibility study for the manufacture of accumulator batteries within the ITEC programme (Indian Technical Economic Co-operation). A consultant, National Industrial Development Corporation (NIDC), of New Delhi was commissioned to undertake the preparation of the feasibility study. The study which was submitted in January 1984, examines the technical feasibility and economic viability of setting up a plant for manufacturing accumulator batteries in PDRY.

2. Product to be manufactured

It is proposed to manufacture lead acid batteries for the automotive applications of (6-12) volts.

3. Demand

The demand for accumulator batteries is restricted to replacement demand. There is no demand for original batteries, as there is no facility for production of cars and other vehicles in PDRY.

The demand of accumulator on the other hand is linked very closely with the growth of vehicles. As shown in Annex I, the increase of vehicles in PDRY has been very predominant in the case of buses and trucks. The overall average annual increase has been around 10.34%.

The consultant has applied several techniques for the projection of future demand of accumulator batteries among which are:

- End use
- Time trend
- Macro approach

On the basis of the three methods used, the demand of batteries worked out to be as:

Demand Projection - Number of Batteries

Year	End Use	Trend Analysis	Macro Approach
1985	56,000	23,000	42,000
1990	92,000	30,000	75,000

The demand by trend analysis is low because of the consumption, due to import restrictions and the low utilization of present plant. Therefore, this does not reflect the true demand and hence it is dropped out. Accordingly, the demand is reached as an average of the other two methods, which is put at 50,000 and 85,000 numbers by 1985 and 1990 respectively.

Although the present plant is intending to increase its output to 25,000 units by 1985, still the cap will be the same magnitude. But by the time the proposed plant is established and operated, the useful life of the existing plant would be reduced to the minimum. Accordingly it is proposed that the proposed plant be expanded in a phased manner to cater the whole future demand of PDRY.

4. Plant capacity and manufacturing process

In view of the economic size of accumulator battery plant and the cap between demand and supply, a plant of 50,000 number of accumulator batteries per year has been recommended.

5. Plant input requirements

The main imported major raw and bought out materials are: virgin lead, lead sub-oxide, vent plugs, separators, fillings, etc.

Total manpower requirement of the proposed plant is put at 83. Other inputs required for the operation of the plant which shall be made available locally are: water, electricity, compressed air, acetylene and oxygen gas.

6. Plant location

Since the present accumulator plant does not have sufficient area for expansion, therefore the proposed plant is suggested to be located in the area of Dar Saad along the Dar Saad - Lehej road, near the old Dar Saad town.

7. Total project cost

The total project cost as estimated by the consultant is outlined below:

	Local currency component US$	Foreign currency component US$	Total US$
- Fixed investment	404,000	1,763,000	2,167,000
- Land	0	0	0
- Civil works and buildings	286,000	656,000	942,000
- Machinery and equipment	118,000	1,107,000	1,225,000
- Working capital	260,000	621,000	881,000
- Pre-operational expenses	98,000	220,000	318,000
- Provision for contingencies (included under each item)	-	-	-
Total	762,000	2,604,000	3,366,000

The capital expenditure has been phased out over a period of 30 months which is considered a practical time for construction of the plant.

8. Information on profitability and return on investment

- Debt/equity ratio 1:3
- Interest during construction period 5%
- Interest long term loan 5%
- Interest short term loan (working capital) 8%
- Average gross return on capital (10 years) 15.28%
- IRR 13.41%
- Pay back period 5 years and 6 months
- Break even point 52.19%
- Sensitivity analysis:
  (i) for a 10% change in sales price of batteries there will be a change of about 12.57% in average gross return on investment.
  (ii) for a 10% change in price of containers there will be a change of about 4.32% in average gross return on investment.

II. Objectives of the Project

A. Development objectives: The overall development objective of this project is to continue to meet the demand of accumulator batteries from the local source in the most economic and effective manner.

B. Immediate objectives: The project's immediate objectives are:

1. To achieve the construction and erection of an accumulator battery manufacturing plant, as well as the installation of equipment, commissioning and the start up of the plant in the most effective and efficient manner.
2. To ascertain that the start up and the commercial running of the plant is carried out in the most efficient and proper manner.
3. Build up the skill of local personnel, through training abroad or at site, for the proper, efficient and continuous operation of the plant with minimum participation of expatriate experts.

III. Outputs Expected and Subsequent Activities Required

A. Outputs

The project aims at producing the following:

1. Project evaluation through appraisal of the techno-economic feasibility study related to the manufacture of accumulator battery update all the data and final report for investment decision.
2. Proper and smooth running of the production line of the plant to enable to produce the designed capacity of 50,000 lead acid batteries per year with the enforced quality control measures.
3. Trained and qualified local personnel for the operation and maintenance of the plant.

B. Activities

To achieve the outputs listed above, the following activities need to be carried out:

1. Review studies, collect additional information and discuss with concerned authorities and prepare report.
2. Prepare equipment specification in co-operation with foreign collaborator, invite manufacturers for supply and erection of equipment and engineering design, analyze bids, make recommendations and award contract.
3. Supervise, monitor and co-ordinate the construction and erection work.

4. Set up a training programme for the local personnel.

IV. Assistance Sought from the Participants

	Time	Cost Estimate US$
Stage I (pre-investment)		
A. One adviser to review all previous reports, collect information, appraise reports, make final report for investment decision	3 m/m	30,000
Stage II (in case the plant is implemented)		
A. Provide technical assistance		
A.1 Pre-operation stage:		
- One adviser for the period of 36 months to assist local staff	36 m/m	300,000
A.2 Operation stage:		
- Comprising of a team of experts and operators to help in the commissioning and operation of the plant and train personnel. To be present at site few months before the start up. The team comprises of:		
- One superintendent for production and head of the team	18 m/m	108,000
- Two technicians, supervisors, one for a year and the other for two years	36 m/m	144,000
- Seven skilled laborers	7 x 18 m/m	252,000
B. Fellowships and training for locals		
- Superintendent, foreman, technicians, skilled laborers	20 m/m	80,000
Total Project Cost		914,000

V. Inputs from the Government

The Government will provide the following:

1. National counterparts to work with the advisers during all phases of of the project assessment.
2. Local staff for the operation of the plant.
3. All raw materials, consumables and utilities for the commissioning and proper operation of the plant.

Annex I

Number of Registered Vehicles and Consumption of Head Acid Batteries in PDRY (Number)

Year	Private	Taxi	Buses	Trucks	Total	Batteries
1975	9,529	1,902	202	8,476	20,109	
1976	9,573	1,944	402	9,136	21,055	
1977	9,869	2,143	534	10,799	23,345	11,957
1978	10,518	2,229	586	11,182	24,515	14,794
1979	11,730	2,482	708	13,912	28,832	18,736
1980	12,783	2,920	788	16,287	32,778	16,700
1981	14,264	3,528	907	18,523	37,222	14,541
1982	-	-	-	(estimated)	42,000	19,913
1983	-	-	-	-	-	21,600

Project Title: Preliminary Technical and Economical Feasibility Study for the Development of Fibre-glass Fishing Boat Workshop

Project No. 31

Project Description

I. Information about the Project

Background Information about the Project and Justification

Project status: A boat-making workshop exists, but only with insignificant potential (both financial and technical), providing only for making simple hand-made boats. This workshop is producing three types of boats:

- "Al-Qazifa" (thrower), 7.6 metres long, 1.53m wide and 0.70m draught;
- "Al-Hoori", 9 metres long, 1.5m wide and 0.65m draught;

(these two types of fishing boats are made from mouldings, locally produced)

- the supporting boat, 10 metres long, made from mouldings imported from Denmark.

This workshop can produce 15 boats per month ("Al-Qazifa" and "Al-Hoori" types).

Difficulties being faced

- Lack of technicians specialized in this trade, this is reflected in the quality of the boats.
- Boats produced are not solid enough as a result of the material utilized.
- The workshop's location is distant from raw material sources.
- These boats, poor in quality, cannot be exported (to neighbouring countries).

Products desired: Fibre-glass fishing boats of the following types and specifications:

- "Addayrak", 20 metres long - 20 boats per year;
- improved "Sonbooq", 15 metres long - 20 boats per year;
- supporting boats, 10 metres long - 20 boats per year;
- "Al-Hoori", 9 metres long - 20 boats per year;
- "Al-Qazifa", 3.6 metres long - 50 boats per year.

At the same time, other items can be produced with the same raw material: containers to hold fish, bath-tubs, thin covers and chairs.

Present and Future Market Situation

Not included in the study.

Project Capacity and Industrial Operations

According to the study, the project's goal is to produce the following types of boats, in quantities as indicated:

- "Addayrak" 20/year
- "Sonbooq" (improved) 20/year
- Supporting boats 20/year
- "Al-Hoori" 30/year
- "Al-Qazifa" 50/year
- Containers to hold fish 50/year

Identified Input Requirements

- Raw materials:

polyester	300 tons/year
fibre-glass	150 tons/year
engines, various powers according to type of boat	140 per year
other equipment, such as radar	
wood and other materials	

- Manpower: (total number 60)

administrative staff	17
engineers and technicians	7
special workers	24
ordinary workers	12

Suggested Location

Three locations have been proposed for the project. The one chosen by those who prepared the study is the present location of the workshop, in view of its adquate space by the sea, favourable for the construction of a slideway for boat launching, and its being close to the "Coast Fishery" office.

Project Overall Cost

YD 1,325,000
(equivalent to US$ 4,637,500)

Fixed Investment

- Land
- Buildings — YD 575,000 (equivalent to US$ 2,012,500)
- Machinery and equipment — YD 350,000 (equivalent to US$ 1,225,000)
- Working capital
- Pre-operation costs
- Emergency reserve

Information on Profitability and Return on Investment

- Net annual profit : YD 97,500 (equivalent to US$ 341,250)
- Ratio of simple rate of return on total investments : 24.5%
- Ratio of simple rate of return on fixed investments : 30.8%
- The study indicates that the financial liquidity of the project provides for the recovery of the invested funds in the sixth year of production.
- Rate of income return : 18%

II. Project Objectives

A) Development Objectives

Fish resources in PDRY are a basic and important economic asset for the country's development policy. Therefore, the project aims at promoting fish resources utilization and developing the necessary infrastructure by providing advanced means for fishing and production. Export would be an other goal to be achieved at a later stage.

B) Immediate Objectives

Development of the existing workshop that makes fibre-glass fishing boats, so that it can produce various types of boats made of better-quality fibre-glass and also produce other commodities utilizing the same raw materials.

III. Outputs Expected and Subsequent Activities Required

A) Outputs

- "Addayrak" boats, 20 metres long — 20 boats/year
- "Sonbooq" boats, 15 metres long — 20 boats/year

-	Supporting boats, 10 metres long	20 boats/year
-	"Al-Hoori", 9 metres long	30 boats/year
-	"Al-Qazifa", 7.6 metres long	50 boats/year

B) Activities

-	Containers to hold fish	50/year
-	Bath-tubs	
-	Thin covers	
-	Chairs	

IV. Assistance Sought

- Up-dating of the feasibility study.
- Training of personnel.
- Other assistance.

V. Gouvernment Inputs

As specified under Project Input Requirement.

Project Title: Preliminary Feasibility Study for a Fish-canning Plant Project

Project No. 32

Project Description

I. Information about the Project

Background Information about the Project and Justification

Project status: In keeping with the policy of the Arab Industrial Development Organization, to give priority to the least developed Arab States, in terms of technical assistance to further their industrial development; considering the importance of fish resources for the national economy of DPRY and overall Arab food security; considering the gap between the supply of and demand for canned fish, with a shortage estimated to be 100 tons in 1986 rising to 2,600 tons in the year 2000 at the domestic market level - that gap would be even greater if the Arab market is to be taken into account; and building on the enormous reserve of various kinds of fish in Yemeni waters; this preliminary study has been prepared to show the importance of sponsoring a project of this nature.

Products to be processed: Two kinds of canned foods are to be processed: sardines, 165 grams, 7 million cans/year; and mackerel, 208 grams, 10 million cans/year (in addition to fish leftovers to be processed).

Present and future market situation: It should be noted, first, that PDRY has been neither exporting nor importing any kind of canned fish. The whole production is consumed locally. In 1983, canned fish production of all kinds totalled some 1,297,604 tons, increasing to 1,492,240 tons in 1984. There are no projects being implemented and no expansion in production. Expected production in the coming years will be limited to the present producers' capacity.

As for consumption, it is totally based on domestic production, growing by 17% a year, as indicated in the study. The annual per capita consumption rate was approximately 3.9 cans (165 g each) in 1983.

According to the study, canned fish consumption is expected to be as follows (three periods):

(1)	(2)	(3)	
1985	1 776.3 tons	1 485.6 tons	1 454.7 tons
1990	3 894.4 tons	2 083.6 tons	1 752.9 tons
1999	10 799.5 tons	3 830.7 tons	2 452.0 tons

In its analysis, the study has used the second hypothesis as a basis. Moreover, the Arab market will suffer from a shortage of canned fish.

Projected Capacity and Industrial Process

The project aims to produce two kinds of canned fish in quantities as follows:

- Sardines, rectangular can, 165 g : 7 million/year.
- Mackerel, round can, 208 g : 10 million/year.
- Dehydrated leftovers to be used as fertilizers or poultry feed.

Project Input Requirements

Raw Materials:

Material	Quantity (tons)	Cost (YD) 1983 prices	US$ (equivalent)
Sardines	1 777	151 045	453,135
Mackerel	3 727	484 510	1,453,530
Supplements			
Tomato oil	136	90 600	271,800
Salt	85	11 900	35,700
Cartons	310 000 cartons	142 600	427,800
Mackerel cans	10 500 000 cans	661 500	1,984,500
Sardine cans	7 350 000 cans	404 250	1,212,750
Energy			
Fuel, oil, lubricant			
Electricity	YD 162 792/year = US$ 569,772		
Water			

Manpower project labour requirements are estimated at some 188 employees, devided as follows:

Management staff	12	
Special technicians	10	
Ordinary technicians	12	YD 131 060/year = US$ 458,710
Skilled workers	74	
Unskilled workers	80	

Other services

Maintenance
Telephone — YD 357,000/year = US$ 1 249,500
Worker transportation

Proposed Location

Aden, as Aden Bay is considered one of the richest areas in fish resources, producing 6.6 tons per square kilometre.

Furthermore, a new fishing port has been constructed at Aden.

Aden, together with its residential agglomerations, accounts for one third of the population of PDRy, making it a favourable nearby consumption market.

The commercial port of Aden and its convenient location for international land routes.

Existence of supplementary raw material sources in Aden.

Total Project Cost :	YD 3 515 000 = US$ 12 489,977
Fixed investment	
Land	-
Buildings	YD 1 140 000 = US$ 3 990,000
Machinery and equipment	YD 1 568 000 = US$ 5 488,000
Working capital	YD 472 000 = US$ 1 652,000
Pre-operation costs	YD 385 000 = US$ 1 347,500
Emergency reserve	-
TOTAL	YD 3 515 000 = US$ 12 489,977

Information on Profitability and Return on Investment

- Profitability — YD 302 743/year = US$ 1,059,600
- Ratio of rate of return on fixed investments : 13.4%
- Ratio of rate of return on total investments : 11.6%

II. Project Objectives

A) Development Objectives

In view of the special importance of fishery resources for the general national economy, the project aims at promoting the utilization of these

resources so as to take into account the enormous quantities of fish that are available in PDRY waters. It also aims at meeting the domestic needs for canned fish and then exporting the surplus, thus strengthening the national economy through the development of this industry.

B) Immediate Objectives

This project directly aims at producing canned fish:

- sardines, 7 million cans/year
- mackerel, 10 million cans/year
- dehydrated leftovers to be utilized as fertilizers or poultry feed.

III. Outputs Expected and Subsequent Activities Required

The following items and quantities to be produced:

A) Outputs

- Sardines (canned), 7 million units/year
- Mackerel (canned), 10 million units/year

B) Activities

- Dehydration of leftovers, fertilizers and poultry feed.

IV. Assistance Sought

- Preparation of techno-economic feasibility study.
- A team of experts consisting of : one engineer, economist, financial expert.
- Training of manpower.
- Machinery and equipment.
- Technical assistance.
- Other assistance.

V. Government Inputs

As specified under Project Input Requirements

Project No. 33

Preliminary Feasibility Study for a Project To Build a Complex for the Manufacturing of Hygienic Tissues and Paper

Part A - Information about the Project

1. Background information about the project and justification

1.1. Project status: until now, there has been no project in Democratic Yemen for the production of hygienic tissues and paper. The country has totally relied on imports to satisfy domestic needs for these commodities. Implementing its policy of providing technical assistance to the least developed Arab countries, AIDO agreed with Yemeni authorities during a visit that AIDO's Director General made to Democratic Yemen to prepare a preliminary feasibility study for the establishment of a complex to manufacture hygienic tissues and paper.

1.2. Products to be manufactured:

- Toilet tissues
- Kleenex (packets)
- Nappies (diapers)
- Soft tissues (pocket-size packs) and table napkins.

1.3. Present and future market situation.

Consumption of these kinds of tissues varies in developing countries according to their economic, cultural and social conditions, so much so that in some countries consumption almost rises to levels attained in developed countries, especially in the case of developing countries with substantial financial resources.

In Democratic Yemen, where economic resources are limited, tissue papers of all kinds were not consumer goods during the first years of independence. However, in recent years they have begun to constitute a specific consumer need among certain groups within the Yemeni society as well as among foreign communities. There has been a growing demand for them, in line with economic and cultural development; average annual imports during the period 1982 - 1984 were:

- Kleenex - 20,000 packets (100 x 2-ply tissues)
- Toilet tissues - 490,000 rolls (it is possible to say that the average consumption was 500,000 rolls a year)

- Nappies - 18,500 packets (14 nappies each)

The average per capita consumption of tissue paper was about 100 g in 1984, totalling 200 tons for the whole population. According to the study, as the population is increasing as well as consumption among citizens, average consumption is expected to be as follows:

	(per capita)	(total)
in 1987	150 g	300 tons
1990	200 g	450 tons
1996	240 g	690 tons
2000	290 g	925 tons

1.4. Planned capacity and industrial processes:

The project aims at producing the following kinds and quantities of tissue paper:

- Kleenex	250 tons	1 350 000 packets
- Toilet tissues	325 tons	2 025 000 rolls
- Pocket tissues	100 tons	300 000 packs
Total:	675 tons	

These capacities are planned on a basis of one shift a day, 270 working days a year.

The different production lines mainly depend on light tissue paper raw material weighing 17 grams per square metre. Other materials would be supplementary for packing or rolling the product, except for nappies which will depend, in their production, on some other principal materials, in addition to tissue paper, such as cellulosic stuffing and other materials to stick and cover the item with.

All production processes are similar as regards the machinery to be used; they begin with connecting tissue paper reels with the machines that cut or pierce them, and make the product ready for packing.

1.5. Input requirements:

Raw materials

- Tissue paper	- soft, light, absorbent, weighing 17 g per square metre;
- Cardboard	- used as small diameter rollers for toilet tissues, weighing 300 - 500 g per square metre;
- Duplex paper	- a kind of cardboard weighing 150 - 250 g per square metre, used for making Kleenex packets;

- Plastics and dyestuffs	- adhesives for boxes, toilet paper rollers;
- Polyethylene (low density)	- used for wrapping toilet paper rolls;
- Other materials	- such as ink, to print specific forms and trade marks.
Service requirements	- electric power
	- water
	- compressed air

Manpower: The study suggests that manpower should be divided in the following manner:

Project manager	1
Management staff	3
Skilled workers	4
Unskilled workers	3
Total	11 employees

1.6. Proposed location:

No particular location is proposed in the study, allowing for a free choice, as any place could be appropriate for this project. (The project could be a complex including all the machinery involved, or could be divided into several projects with each machine constituting a sub-project in itself.)

1.7. Project overall cost:	YD. 370.000	US$ 1,295.000
Fixed investment:		
Land	-	-
Buildings	YD. 150,000	US$ 525,000
Machinery and equipment	YD. 125,000	US$ 437,300
Working capital	YD. 65,000	US$ 227,500
Pre-operation costs	YD. 7,000	US$ 24,500
Emergency reserve	YD. 23,000	US$ 80,500
Total	YD. 370,000	US$ 1,295,000

1.8. Information on profitability and return of investment:

Profitability - The total profitabilit in the first year of operation (1987) would be 25% of the planned capacity, amounting to YD.45,000 equivalent to US$ 157,500, but the profitability would rise, according to the study, to YD.134,000 equivalent to US$ 469,000 in 1996 when 57.7% of the project capacity would be utilized.

Data on money flows and finance planning clearly show that the period needed to recover capital paid as of the first year of operation (1987) is

five years. According to the study, this period could be cut by half if the project operates with higher capacity in case of sufficient domestic and external demand.

1.9. Project objectives:

- Development objectives: The manufacture of all kinds of tissue paper is characterized by its simplicity and little cost. As Democratic Yemen has no such industry until now, and is still relying on imports to satisfy domestic needs, and as the consumption of these products has been growing progressively in the Yemeni environment, the project aims, first, at covering domestic consumption in its early stages and, secondly, exporting at a later stage. The realization of this project would therefore lead to an expansion of existing industries and would contribute to industrial growth and economic development.
- Immediate objectives: The project aims at manufacturing tissue papers of various kinds:
  - Kleenex
  - toilet tissues
  - pocket tissues

- Projected outputs and subsequent activities:

  Outputs - Kleenex
  - toilet paper
  - pocket tissues

  Subsequent activities: two other kinds of tissue paper can be produced:
  - Feminine hygiene towels
  - Hotel and restaurant napkins and towels

- Assistance sought and inputs:

  Assistance could be provided in several forms as specified under the project input requirements.
  - Machinery and equipment
  - Technical assistance
  - Other kinds of assistance

- Assistance provided by the Government:

  As specified under project input requirements.

Project Title: Preliminary feasibility study for a project to manufacture corrugated cartons

Project No. 34

Project Description

I. Information on the Project

Background Information about the Project and Justification

Project status:

The carton industry has no place, until now, among existing industries in Democratic Yemen. The country still depends on imports to satisfy domestic needs. As development plans have been increasing, a greater need for packaging materials has emerged, as well as a need for the complementarity of production with such materials, leading those who plan economic development in general, and industrial development in particular, to devote special attention to this branch of light manufacturing industry. The competent authorities have thus been prompted to request AIDO's assistance in preparing preliminary feasibility studies for this industry. In deeping with the Organization's aims of providing technical assistance to the Arab States, and to the least developed in particular, AIDO prepared this study as a step towards the creation of a carton industry in Democratic Yemen.

Product to be manufactured:

The project aims at producing:

- Corrugated cartons.

Present and future market situation:

According to the study, it was impossible to obtain information on corrugated cardboard. Statistics based on time series for imports or orders were thus avoided and the research focused rather on precise information for one year: 1982. The volume of demand for corrugated cardboard was about 716 tons in 1982, and it is expected to be around 1,430 tons in 1987, to rise to nearly 4,700 tons in 1995 and to some 10,000 tons in the year 2000. In the year 2005, the end of the proposed duration of the project, demand is expected to reach 20,000 tons.

Proposed capacity:

The study suggests that plant capacity would be 5,000 tons/year, on a basis of one shift a day and 270 working days a year until 1995.

Manufacturing process:

This will go through the following stages:

- Production of a line of squared cardboard using a number of paper layers some of which are corrugated. (This stage would constitute one production line, in addition to a cutting-up stage).
- Cutting up the line into carton sheets according to the desired size of the box.
- Incision, slicing and stamping the desired marks.

Input requirements:

Raw materials:

There are both primary and secondary raw materials involved in the manufacture of corrugated cartons. The list of primary raw materials includes:

1. Paper: craft, which contains a high proportion of long fibres, is normally used and is classified in two kinds of paper according to usage:

- Corrugation paper
- Flat paper

2. Dyestuffs and adhesives: these are essential in the manufacture of currugated cartons. The following items are used:

- Dextrin
- Neutral sodium silicate.

As for the secondary materials used in the manufacturing of corrugated carton, they are:

- Ink
- Staples
- Pack thread
- Materials used for the treatment of boiler water; these are chemicals (trisodium phosphate, hydrozine, sodium sulphite).
- Service requirements: most important are water vapour and electricity.
- Manpower: according to the study, the peak number would be 79; in the first two years, 65 workers might be enough to operate the plant. The employees are classified as follows:

Management staff	3
First-class skilled workers	3
Second-class skilled workers	15

Semi-skilled workers	23
Unskilled workers	35
Total	79

Location:

Aden is suggested in the study as an appropriate location for several reasons, including:

- The market - the project can easily be supplied with raw materials - availability of adequate labour - availability of other services.
- The plant could be set up in one of two districts of Aden: Al-Mansoura or Khor Maksi; both are designated for industrial projects.

Project overall cost:

Fixed investment:	YD. 3,165,000	US$ 9,495,000
Land	-	-
Building	YD. 1,383,000	US$ 4,149,000
Machinery and equipment	YD. 1,202,000	US$ 3,606,000
Working capital	YD. 300,000	US$ 900,000
Pre-operation cost	YD. 88,000	US$ 264,000
Emergency reserve		
Total	YD. 2,973,000	US$ 8,919,000
Additional to total (bank interest)	YD. 192,000	US$ 576,000

Information on profitability and return on investment

- Ratio of gross profit: sales = 38.5%
- Ratio of net profit: sales = 24.0%

These two ratios were calculated for the ninth year of the project's life, when the plant would be operating with a capacity close to the contractural capacity and on a one-shift basis.

According to the study, the capital pay-back period would be 10 years from 1985, the year when the project would be initiated - this is with only the domestic market being taken into account. The period could be shorter under the following conditions:

- If the market situation corresponds to the prospects indicated in the study;
- If the plant is constructed after 1985;
- If exports are partly included in the market.

II. Objectives of the Project

A) Development Objectives

As the carton industry is still not among the industries existing in Democratic Yemen, and as the country is still dependent on imports to satisfy its basic needs for this commodity, the aim of this project is to develop the industrial sector by introducing a new industry, to cover, for the time being, domestic needs, and then to start exporting at a later stage.

B) Immediate Objectives

The project aims at the production of corrugated cartons with a capacity of 5,000 tons a year up to 1995.

III. Outputs Expected and Subsequent Activities Required

A) Outputs

- Corrugated cartons, 5,000 tons/year up to 1995.

B) Activities

Assistance sought and inputs

- Machinery and equipment
- Technical assistance
- Other

Inputs provided by the Government

Project Title: Technical and economic feasibility study on a project for the production of shaving-cream and toothpaste

Project No. 35

Project Description

I. Information on the Project

Background Information about the Project and Justification

Project status:

In view of the citizen's need for toothpaste and shaving-cream, and the increasing importance of these commodities for the effect they have on the citizen's health and good appearance; in view of the lack of such industry in Democratic Yemen; and to be in keeping with the growing demand for these products as a result of greater awareness among people as well as increasing population and higher income, it was considered necessary to develop a project for the production of these articles; this would foster industrial development and limit payments in foreign exchange.

Products to be manufactured:

The project aims at producing toothpaste and shaving-cream.

Present and future market situation:

A) Toothpaste

Production - none whatsoever until now.

Consumption - according to the study, the annual rate of consumption, for the period 1979 - 1983, was 93 tons (and the annual rate of consumption growth was 8.6, based on an annual population grwoth of 2.6% income increase).

Per capita consumption in Democratic Yemen is very low, compared to per capita consumption in developing countries; while it was 59.5 g in Yemen, it was 460 g in New Zealand, 412 g in Venezuela and 223 g in Malaysia.

The gap between demand and current production: represented by the total volume of demand and current production is nil.

B) Shaving-cream

Production - none whatsoever in Democratic Yemen.

Consumption - calculated by comparing per capita consumption in Yemen with that of Iraq, using a proportionality factor of 50%, as there are no precise data on the volume of imports of this article. An annual consumption rate of 40 tons was posited by the study.

Project demand:

Toothpaste: According to the study, the demand for toothpaste is expected to be 140 tons in 1985, rising to 195 tons in 1990 to reach 426 tons in the year 2000.

Shaving-cream: 43.4 tons in 1985, 65.6 tons in 1990, and 145.6 tons in the year 2000.

In calculating demand projections, the study assumed that the annual population growth rate would be 2% instead of 2.6% for the period from 1996 to the year 2000, and daily per capita consumption would be 3 g for toothpaste and 2 g for shaving-cream.

Planned capacity and manufacturing processess

The capacity of the project is planned to take into account the volume of demand, which would be 152 tons/year for toothpaste and 50 tons/year for shaving-cream, on a basis of one shift per day for the first two years of production, after which there may be a change of two or three shifts a day.

Description of the manufacturing process: for toothpaste, the manufacturing process is a kind of mixing operation, with no chemical interaction involved. It proceeds as follows:

- Part of a liquid composition, which is a mixture of water and saccharin, is added to a beater, then drawn by the activation of a vacuum pump;
- A mill is then activated (with a mixer) inside the beater, and the lock between the powder-feeding container and the beater is opened to let the powder into the beater where they mix with the liquid substance;
- The other part of the liquid mixture is then slowly drawn off to give a better and more homogeneous mixture. This mixing process continues until all powders are drawn off, then essence and preservatives are added. Each process takes two hours for completion of the mixing cperation; the paste is then stored in special containers and taken to a filing machine.

As for the shaving-cream, the manufacturing process is as follows: It is actually a chemical process in which caustic potash (the base) reacts to, and forms a compound with, oily substances. High temperature is required to accelerate the chemical reaction.

- Caustic potash solution is added to a beater after directing heat on to its external surface; then coconut oil soap is produced. Complete soap formation is to be ascertained.
- Stearic acid is drawn (as liquid) into the beater; it reacts to the caustic potash and heat is generated.
- A mixture of saccharin and water begins to be drawn in to dilute the composition; then cooling water is directed on the external surface of the beater to cool the mixture down to normal temperature. The cream thus obtained is taken to a special storage tank, then to a filling machine.

The machines and equipment required for production operations are:

- A mixer (machine) - a filling machine - 4 stainless steel storage tanks - a suitable container, 200 litre capacity, to mix water with lexirin - a container, 150 litre capacity, equipped with a heater to melt the stearic acid - another container to dissolve potash.

Input requirements

Raw materials for toothpaste:

- Phellomina - sodium phosphate fluoride - sorbitol - ambicole - saccharin - disinfecting substance - carbox - flavouring, monodium phosphate - vital-linium dioxide - distilled water - tubes - cartons.

As for the shaving-cream, it requires the following basic raw materials:

- Stearic acid (distilled) - coconut oil or acid - potassium hydroxide (caustic potash) - lexirin - disinfecting substances, such as sodium silicate, boric acid and cetyl alcohol - essence - eater - tubes - cartons.

Manpower: according to the study, 21 workers are needed for the project, in addition to 2 engineers and 2 technical supervisors.

Planned location

Aden is suggested by the study to be a location for the project, in view of the following factors:

- Import and export operations can easily be carried out;
- Product consumption is concentrated there;
- Presence there of a plant for essence products and a soap plant; It might be possible to set up the proposed plant within one of them, since the nature of the work is similar.

Project Cost:

Total investments	YD. 220,533	US$ 661,599
of which:		
Machines and equipment	YD. 56,486	US$ 169,458
Buildings and constructions	YD. 114,000	US$ 342,000
Working capital	YD. 44,047	US$ 132,141
Pre-operation cost	YD. 6,000	US$ 18,000
Cost per ton:		
Toothpaste	YD. 1,008	US$ 3,024
Shaving-cream	YD. 743	US$ 2,229
Average cost/ton	YD. 942	US$ 2,826
Toothpaste import cost per ton =	YD. 1,220	US$ 3,660
Toothpaste profit per ton = YD. 1,220-1,008 =	YD. 212	US$ 636
Total profit, for the first year of toothpaste production = YD. 212 x 152 (tons) =	YD. 32,224	US$ 96,672
Total profit in the year 2000 (from toothpaste production) =	YD. 86,726	US$ 260,178
Shaving-cream:		
Production cost (per ton) =	YD. 743	US$ 2,229
Import cost (per ton) =	YD. 940	US$ 2,820
Profit made (per ton) = YD. 940 - 743 =	YD. 197	US$ 591
Total profit, for the first year 197 x 50 (tons) =	YD. 9,850	US$ 29,550
For both products, the average cost per ton =	YD. 942	US$ 2,826
The average selling price (per ton) =	YD. 1,150	US$ 3,450
Sales proceeds for the production of 202 tons/year = 202 (tons) x 1,150 (YD) =	YD. 232,300 (per year)	US$ 696,900
Profit made in the first year = (1,150 - 942) x 202 =	YD 42,016	US$ 126,048

Rate of return on investment for the first year = $\frac{420\ 16}{220\ 500} \times 100 = 19\%$

II. Project Objectives

In view of the importance of the commodities to be produced for the citizen's health and appearance, and as such commodities are still not locally produced, the project aims at manufacturing them for local consumption, as well as promoting industrial development in Democratic Yemen and saving foreign exchange.

III. Project outputs

The project is expected to produce annually 152 tons of toothpaste and 50 tons of shaving-cream.

IV. Assistance sought

Assistance could be provided in several forms:

Material

- Financial aid;
- Easy loans;
- Provision of machinery and equipment required for production.

Technical

- Provision of the necessary technical expertise for the implementation of the project;
- Preparation of the required studies;
- Training of national cadres through the organization of training workshops inside the country and abroad.