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ASSISTANCE TO THE PREFERENTIAL TRADE AREA IN THE PROMOTION AND MONITORING OF THE IMPLEMENTATION OF SUB-REGIONAL PROJECTS

RP/RAF/84/032

Technical report: Sub-regional industrial programme for Eastern and Southern Africa within the framework of the Industrial Development Decade for Africa (IDDA): Status and Evaluation of a selected number of multi-national industrial investment projects*

Prepared for the Secretariat of the Preferential Trade Area (PTA)
by the United Nations Industrial Development Organization

Based on the work of S.G. Odia,
consultant in industrial project preparation

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Abbreviations

IDDA	Industrial Development Decade for Africa
PTA	Preferential Trade Area
OAU	Organization for African Unity
ECA	Economic Commission for Africa
SADCC	Southern African Development Cooperation Conference
MULPOC	Multi-National Programming and Operational Centres
ESAMRDC	Eastern and Southern African Mineral Resources Development Centre

ABSTRACT

In 1983 and 1984, OAU, ECA and UNIDO organized, within the framework of the Industrial Development Decade for Africa, sub-regional expert group meetings for the preparation of initial sub-regional industrial programmes. The meeting for Eastern and Southern Africa resulted in a programme including investment projects and support projects.

As a follow-up to this meeting UNIDO was requested to assist the Preferential Trade Area (PTA) Secretariat in the implementation of the programme, and in particular in the promotion of the following ten selected multi-national investment projects included in the programme:

1. Rehabilitation of a Rolling Mill (Uganda)
   (Replaced by an Integrated Iron and Steel Plant)
2. Establishment of a Steel Rolling Mill (Zambia)
3. Manufacture of Irrigation Equipment (Zambia)
4. Manufacture of Transformers (Zambia)
5. Manufacture of Potash Fertilizer (Ethiopia)
6. Manufacture of Phosphate Fertilizer (Uganda)
7. Manufacture of Phosphate Fertilizer (Zimbabwe)
8. Manufacture of Caustic Soda (Kenya)
9. Manufacture of Sheet-Glass (Madagascar)
10. Manufacture of Cement (Mauritius).

This report describes and evaluates these 10 multi-national industrial projects; it includes a presentation of the sponsoring countries and investment project profiles.

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I. BACKGROUND INFORMATION

1. Introduction

In October, 1984, the Preferential Trade Area (PTA) Secretariat requested urgently the assistance of UNIDO in collecting and analysing information which would enable PTA, the African Development Bank, the World Bank, UNECA, and other relevant regional and international organisations to decide on a limited number of sub-regional industrial projects for which investment project profiles could be prepared for promotion among potential financial investors. The request was based on the outcome of the sub-regional meeting on the promotion of intra-African industrial co-operation within the framework of the IDDA jointly organised by the OAU, ECA and UNIDO at Addis Ababa in November, 1983. At that meeting, UNIDO was invited to assist, in co-operation with the OAU and ECA, in promoting, co-ordinating and monitoring the implementation of the initial integrated industrial promotion programme adopted at the meeting.

In response to the PTA request, a Consultant was accordingly assigned to the Secretariat for 3½ months from November, 1984. The purpose of the Consultant's assignment is:

- to review national and sub-regional studies related to ten priority sub-regional projects which have been identified by PTA and UNIDO Secretariats in the above mentioned integrated sub-regional industrial programme;
- to assist in the preparation of investment project profiles on the selected projects.

The projects are as follows:

a. Rehabilitation of a Rolling Mill (Uganda)
(Replaced by an Integrated Iron and Steel Plant)

b. Establishment of a Steel Rolling Mill (Zambia)

c. Manufacture of Irrigation Equipment (Zambia)

d. Manufacture of Transformers (Zambia)

e. Manufacture of Potash Fertilizer (Ethiopia)

f. Manufacture of Phosphate Fertilizer (Uganda)

g. Manufacture of Phosphate Fertilizer (Zimbabwe)

h. Manufacture of Caustic Soda (Kenya)

i. Manufacture of Sheet-Glass (Madagascar)

j. Manufacture of Cement (Mauritius).

Additional projects may be considered only if they justify the criteria for core sub-regional projects as laid down in the IDDA programme.

Four factors were identified as likely to foster or hinder the implementation of sub-regional projects:

(i) The existence of SADCC within PTA demands close co-operation between the two organizations;

(ii) Commitment to PTA cause by all member-countries still not a reality. Four member-countries are still to sign the Protocol Agreement, and the degree of commitment varies from country to country;

(iii) In adequacy of infrastructure, expecially transportation and communications. (Attempts are, however, being made to mitigate this inadequacy by the PTA and UNECA);

(iv) Differences in the level of industrial and technological development amongst the PTA countries. There is, therefore, the fear that an effective promotion of sub-regional industrial co-operation will tend to favour the more industrialized and advanced countries.

2. The Industrial Development Decade for Africa

The United Nations General Assembly had proclaimed the 1980s as the Industrial Development Decade for Africa. At its thirty-eighth Session in December, 1983, the Assembly approved additional allocation to UNIDO of US$1 million for assistance to African countries and organisations in 1984 for the implementation of their programmes and projects related to the IDDA. In 1985, an additional sum of US$5 million was allocated specifically for this purpose.

The purpose of the United Nations proclamation is to focus greater attention and commitment of the world as a whole to the importance of industrial development as a means of attaining rapid economic growth, overall development and better standard of living in Africa. The programme, in essense, presumes that the necessary initiative and stimuli must emanate, first and foremost, from within each country of the sub-region so as to form a solid base on which a self-reliant and self-sustaining growth through an integrated development strategy can be fostered. The complexity of the challenge of such a programme demands determination especially at the national level as success of the programme depends more than anything else on the countries themselves. Success also depends on an integrated industrial development strategy that is linked to other sectors of the economy, and in tune with national development plans and aspirations. Implementation of the Programme presumes a greater and effective mobilisation of the resources of the countries concerned, close co-operation, especially in matters relating to trade, transportation, technology and skills, at the sub-regional and regional levels, and substantial assistance from outside the region, on a bilateral or multi-lateral basis.

At the National Level, the countries must be concerned with the careful identification of core industrial projects as defined under the IDDA, and pay attention to the development of physical infrastructure, institutional mechanisms, skills, and technology, and local in-puts. A detailed assessment of the financial requirements and the establishment of Sectorial linkages are among the primary responsibilities of the countries concerned.

At the Sub-Regional Level, it is essential to work out a formidable programme of industrial complementarity of core projects based on resource endowment factors and, joint and/or cross participation in order to optimise limited investment resources and enlarge the markets. To attain this objective, it is essential to identify potential core industrial projects of interest to the countries leading possibly to the Multinational Industrial Corporations between two or more countries. The establishment of an Information System should facilitate intra-African co-operation especially in the fields of training, energy, trade harmonization and the elimination of trade barriers. Above all, relevant sub-regional institutions should be strengthened or established to foster the industrial programme at the sub-regional level and supplement the activities of the national institutions.

3. I.D.D.A. Priorities:

The major priority sub-sectors stipulated under the IDDA programme are as follows :

(1) Agro-Industry:

This sub-sector requires priority in allocation of resources in order to meet basic needs of the people and be more self-reliant especially by limiting their import contents and providing adequately locally available inputs. The programme calls for more processing of agro-outputs and the production and use of fertilizers, pesticides and agricultural machinery in order

to enhance production and research into better ways of storage and preservation.

(2) Building and Construction Industry:

Basic needs like shelter and the development of the infrastructure have strong linkages with other sub-sectors of the economy. The programme therefore calls for the intensification of the production of certain strategic materials like cement and the need for research into the use of more local inputs for the industry.

(3) Metallurgical Industry:

The sub-region is blessed with a large number of valuable metallic and other minerals which are not fully exploited. At best, the few minerals exploited are being exported after little or no processing. This sub-sector can become a major foreign exchange earner and save the sub-region considerable amount of money that is being spent on processed metallic products that are imported back to the various countries. It can also become the foundation on which to build a wide-range of industries covering various sectors and producing goods for local consumption and export. It is not surprising therefore that the IDDA programme places high priority on the development of this sub-sector and especially the development of Iron and Steel and Copper and Aluminium industries. Great eimportance is also placed on the need for co-operation and joint-venture for purposes of exploitation and development in view of the high cost of technology involved and the need to ensure a ready market for its products.

(4) Chemical Industry:

The IDDA stresses the need to develop production facilities for certain priority chemicals like Fertilizers and Pesticides, which are essential for higher production in agriculture, and other chemicals and pharmaceuticals, especially those which can be extracted from local resources and essences from plants. Here again, the need for co-operation and the formation of multi-national Corporations is emphasised as a means of mobilising resources on sub-regional basis.

(5) Engineering Industry:

The development of the Engineering Industry as a means of enhancing technological development and providing the required machinery, equipment, spare parts and components to all economic and social activities.

The identification and selection of core projects under these priority sectors are based on the principle of attaining self-reliance and self-sustained industrialization. The projects selected must therefore meet basic domestic needs, act as stimuli to other sectors of the economy and enhance the development of the requisite indigenous capabilities. In short, these projects must ensure full and effective utilization of local natural resources and have strong linkages with established industries, create employment and diffusion of technological know-how. The linkage and complementarity factor need to be projected at the national as well as the sub-regional levels. In the long run, it is expected that this policy will not only enhance industrialisation, but also accelerate the local production of inputs for other sectors and the gradual development of capital goods industries in the sub-region.

4. The Preferential Trade Area (PTA)

The preferential Trade Area consists of some eighteen countries* with a total population of 140 million. The total Gross Domestic Product (GDP) is about US$60 billion. It has abundant agricultural land with numerous lakes and rivers that provide the sub-region with great potential for irrigation. Above all, the sub-region is endowed with a substantial proportion of the most valuable minerals in the world. All these factors constitute a significant base for the establishment and development of a strong and viable industrial sector.

Unfortunately, only a small proportion of the available arable land is cultivated and very little of the water resources is utilised either for irrigation, transportation or harnessed for electricity. The sub-region remains one of the poorest in the world with a lower growth rate than sub-regions in other continents. In fact, World Bank projections indicate declining growth rate and a more widespread poverty in the future.

A number of reasons account for the deteriorating economies of the sub-region. Perhaps the most significant is the excessive dependence on the more industrialised countries. Hitherto, the prevailing industrialisation policy of most countries was based on import-substitution, relying heavily on inputs from industrialised countries, rather than the processing of local raw materials and the development of other local inputs. The terms of trade declined by about 36% compared with the 1970s. The prices of exports decreased as a result of recession in the industrialised countries while the prices of manufactured imports

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*The Member-countries of the PTA are: Angola, Botswana, Burundi, The Comoros, Ethiopia, Kenya, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Seychelles, Somalia, Swaziland, Uganda, Zambia and Zimbabwe.

continue to rise. Foreign exchange has, as a result, become scarce. In a desperate effort to conserve foreign exchange, Governments instituted measures to reduce imports which affected adversely, the imports-dependent productive sector. Spare parts, raw materials, intermediate and capital goods are invariably in short supply. Industries are therefore compelled to operate below capacity.

The effect of the scarcity of foreign exchange is not limited to the manufacturing sector only. Certain essential inputs for increased productivity in agriculture, like fertilizers, pesticides, irrigation equipment are also affected. The plight of the agricultural sector has been worsened by severe drought resulting in food deficit and a rise in the importation of foood items in a sub-region that is traditionally agricultural.

General low level output in both the agricultural manufacturing sectors automatically entails low performance in the service and other sectors and reduction in public revenue which, in turn, imposes limitations on overall expenditure on development. This vicious circle imposing problems of declining economic growth, under-employment and poverty and characterised by over-reliance on industrial countries for aid, technology, expertise and food demands a change of strategy.

5. The PTA Industrial Programme

It is therefore not surprising that the IDDA programme proclaiming a self-reliant and self-sustaining industrial strategy was embraced with the signing of the Treaty establishing the Preferential Trade Area for Eastern and Southern African States on the 21st of December, 1981 by all member-countries. The instrument for attaining the change in strategy is

through economic co-operation in all fields of economic activity, "with the aim of raising the standard of living of its peoples, of fostering closer relations among member-states; and to contribute to the progress and development of the African continent."*

Initial efforts on the industrial sector have been to promote inter-country co-operation and specialisation in the development of basic metallurgical industries, agro-based industries and consumer goods industries in accordance with the natural resources endowments of the member-countries. This includes rehabilitation and fostering the capacity of existing national industries with strong linkages and complementarities that can enhance the industrialisation of the sub-region.

Secondly, efforts are directed towards identifying and eliminating gaps and constraints militating against the attainment of the set objectives. The PTA Secretariat's Work-Plan for the development of basic industries emphasised Iron and Steel, Chemicals and Fertilizers and Engineering industries. The relatively more advanced Zimbabwe Iron and Steel Complex - ZISCOSTEEL - is serving as the focal point for rehabilitating and improving the efficiency of existing national Steel Plants and Rolling Mills, and as the source of raw materials and know-how.

Two major constraints are the shortage of foreign exchange and inadequate intra-State transport facilities. A Clearing House, based in Zimbabwe, has been established in February, 1984 to facilitate clearing and payments arrangements. The crucial gaps in the inter-State transport links - by railway and road, have been identified and the sum of US$1.04 million is to be mobilized to improve efficiency and provide the necessary links. Similar effort is being made with coastal shipping

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*Article 3 of the PTA Treaty.

and inland water transport. Arrangements are being made for the establishment of a trade and documentation centre for the disemination of information on trade, industry and related matters and an inventory of production enterprises. Finally, agreements have been reached on the elimination of trade barriers in respect of a list of commodities. All these activities are considered necessary for the mobilisation of financial and technical resources, the establishment of the PTA Trade and Development Bank has been resolved and a resoultion on the mobilisation of financial and technical resources, internationally, is being submitted to the United Nations General Assembly for ratification.

II. COUNTRY MISSION REPORTS

The consultant undertook missions to eight PTA member-countries which have been selected on the basis of their involvement in the ten sub-regional projects selected for the mission. The countries visited are as follows: Zambia, Zimbabwe, Tanzania, Uganda, Ethiopia, Mauritius, Madagascar and Kenya.

1. ZAMBIA

1.1 Zambia is blessed with considerable natural resources, fertile land and valuable forest resources. Of all the 18 PTA countries, it has the most varied and richest deposits of metallic minerals. It has also achieved considerable success in developing its infra-structure. Railways link Zambia with the ports of Dar-es-Salaam (Tanzania) and Maputo (Mozambique). Another railway line is soon to link Zambia and Malawi. Rail links also exist with Angola and Zaire. It has the most developed hydroelectric power and exports 45% of its electricity to neighbouring countries.

1.2 Most significant of its rich metallic resources is copper which accounts for 90% of external revenue. Fall in world market price of copper of over 60% in the last ten years has had a detrimental effect on the economy and dictates the need to diversify in order to reduce over-reliance on copper. The national strategy for industrialization is the utilization of more local inputs and less reliance on importation of raw materials and intermediate goods.

1.3. Projects Submitted for PTA Support: The following projects have been submitted for PTA support :

1.3.1. Irrigation Equipment Plant*

This proposal is fully supported as a high priority project with considerable demand and linkages between industry, agriculture and other sectors of the economy.

1.3.2. Copper Fabrication Plant (Zambia)**

A plant for the production of copper wires is already in existence. It is recommended that this plant should serve as a base for the development of a subregional Plant to produce copper plates and other products. Co-operation between Zambia - Zimbabwe on certain policy matters - supply, pricing and processing - considered most desirable.

1.3.3. Manufacture of Transformers***

A Swedish Company (Bevi and ASEA) has expressed interest and Swedish funds likely to be available.

1.3.4. Integrated Pulp and Paper Project

Adequate raw materials - plantations of Pine and Eucalyptus - are available. Project is held up for financial reasons. PTA aid is being sought

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* Please see Annex A for detailed Project Profile.

** Please see Annex F3 for detailed Project Profile.

*** Please see Annex E for detailed Project Profile.

to provide joint-venture partner, loan finance, plant and equipment supply. Project has also been submitted to SADCC for support.

1.3.5. Other projects submitted to PTA are the

(1) Manufacture of Glass-Sheet; and

(2) Manufacture of Drugs.

Lack of local raw materials and inputs for these projects make them less attractive.

2. ZIMBABWE

2.1. Zimbabwe is also a land-locked country with rich mineral resources and a well-developed infrastructure. The economy is relatively very strong, broadly based and well diversified. Mining plays a key role in the country's exports drive while agriculture is the chief source of occupation for 70% of the population. The industrial sector contributes over 25% to the Gross Domestic Product (GDP) and is by far the most developed industrially in the subregion.

2.2. Projects Submitted for PTA Support

2.2.1. Ziscosteel - Iron and Steel Plant is the most modern and perhaps the only fully Integrated Iron and Steel Plant of significance in the subregion. An Austrian Company has already been commissioned to carry out a study on the expansion potentials of the Company which is believed to be limited by the relatively poorer quality of its inputs and its present location. Because Zimbabwe is technologically ahead of other States in the subregion, the scope for co-operation with other member-States is considerble especially in the field of training, transfer of technology and the supply of inputs to Rolling Mills and other intermediate and capital goods.

2.2.2. Manufacture of Agricultural Machinery and Equipment

SADCC is already involved with this project. Any further action will require close co-operation with SADCC. Already Zimbabwe manufactures a wide range of agricultural implements and assembles a few tractors. The proposition is to manufacture tractors eventually.

2.2.3. Phosphate Fertilizer Plant

ZIMPHOS Limited, a completely private Company produces Phosphate Fertilizers mainly for local use in Zimbabwe. A small proportion is exported to Malawi only. Although the project is not quite profitable in view of limited resource endowment, the linkages both forward and backward are considerable, e.g. aluminium sulphate produced as by-product is utilized for water treatment and lead nitrate, another by-product, is used for extracting gold. The project has been withdrawn from the list submitted for PTA support.

2.3. Refractories

Refractories are important inputs in the metallurgical, glass, cement and engineering industries, and any other industry which entails the use of heat in the process of production. Almost all the refractories utilised in the sub-region are imported. Some technology in the production of refractories does exist in Zimbabwe. Therefore, on the assumption that suitable refractory clays exist, a subregional project is recommended for Zimbabwe.

3. TANZANIA

3.1. Tanzania is not yet a member of PTA. It is expeced that it will become a member before the end of 1985. The discovery of natural gas and traces of petroleum places Tanzania in a strategic position by enhancing the future complementary role it can play in fostering the industrial development of the subregion.

3.2. Core Projects of Interest to PTA

Pesticides and Pharmaceutical factories are presently operating at less than 40% of capacity because of the difficulty of finding foreign exchange for the importation of inputs. Soda Ash production and the proposed Sheet-Glass project to be commissioned in July, 1985 are also of interest to the PTA.

4. UGANDA

4.1. The economy is in utter ruin due to the civil war. The mining sector has ceased to exist. There is also a decline in agriculture and deterioration in infrastructural facilities. Nevertheless, it has the richest deposits of phosphate and Iron Ore in Africa.

4.2. Projects Submitted for PTA Support

It is strongly recommended that PTA supports the Integrated Iron and Steel project, as an alternative to Ziscosteel, and the Phosphate Plant.* Both industries have strong backward and forward linkages and PTA member-countries should be encouraged to participate in the implementation of the projects.

5. ETHIOPIA

5.1. The economy has shown considerable decline due to problems like drought, lack of foreign exchange for imports of raw materials, etc. The most significant mineral resources from the sub-regional point of view is the rich deposit of potash.

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*Please see Annexes C.1. and D.2 for Project Profiles.

5.2. Projects Submitted for PTA Support

5.2.1. Potash Fertilizer Project*

It is probably the only source of potash in Africa. The project is also seen as a potential foreign exchange earner.

5.2.2. Soda Ash

Deposits exist not far from the Kenya border. Kenya deposits are already being fully exploited and providing more than enough to meet the whole of Africa's requirements. Tanzania is also exploiting its deposits. Therefore, in respect of Ethiopia, this is not a priority project for PTA.

5.2.3. Salt Lodisation

Purpose of the project is to prevent the high incidence of goitres in Ethiopia.

5.2.4. Pumps for Irrigation

No feasibility study yet, and no raw materials are available, but the authorities are committed to implementing the project and will endeavour to get North Korean aid. It should be noted that a project, that is fully backed with feasibility study, is in the pipeline in Zambia.

5.2.5. Hand Tools and Cutlery**

No feasibility study is available and no raw materials are available but a preliminary study shows that the project will not be viable until after 10 years of commencement. The only project worth supporting by PTA is the Potash Fertilizer Plant.

6. KENYA

6.1. The mining sector is relatively small. It is however the major producer of soda ash in Africa. Kenya also has relatively well-developed infrastructure. The decline in agricultural production in the past two decades is due to drought and poor management.

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* Please see Annex D.1. for detailed Project Profile
**Please see Annex F..2 for detailed Project Profile.

6.2. Projects Submitted for PTA Support

Endowment factors are not in favour of most of the projects submitted for PTA consideration, except for the production of caustic soda.* It is strongly recommended that the manufacture of caustic soda should be supported. Implementation of the project had been delayed because of the indecision as to which technology to adopt in the implementation of the project. It has also been recommended that the chemical process should be adopted in preference to electrolysis method, and that the existing applications from the private sector for the production of a certain amount of caustic soda by the electrolysis method should be approved in view of the limited but useful by-product like chlorine that will emanate from such a project.

7. MADAGASCAR

7.1. Madagascar, the fourth largest island in the world has a number of rare and invaluable minerals like chromite, bauxite, etc. which is found no where else in the subregion. It also has large quantities of good quality of bitumen.

7.2. Projects Submitted for PTA Support

7.2.1. Glass-Sheet**

A study undertaken in 1976 showed that the project was not viable in view of the smallness of the market. Soda ash, the main input for the production of glass-sheet is also not available locally. With the creation of the PTA the markets appear large enough to make the project feasible. However, the Government has specifically requested that a decision on this project should await a review of the project to be undertaken by UNIDO.

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* Please see Annex D.3 for detailed Project Profile.

**Please see Annex B.1 for detailed Project Profile.

7.2.2. The Consultant recommends that the development of bauxite and chromite which are not found anywhere else in the subregion takes priority over the proposed glass-sheet project.

8. MAURITIUS

8.1. Mauritius with a population of only 960,000 has the most highly educated population, the second most highly industrialised economy after Zimbabwe, and the least endowed with mineral resources in the subregion. It has the highest per capita income and probably the best managed economy.

8.2. Projects Submitted for PTA Support

8.2.1. Cement*

The Cement project proposal using coral sand, is fully endorsed. However, it was noted during the Consultant's visit that down-stream stages of the Iron and Steel industry has reached an advanced stage and that the Fertilizer project is perhaps the most efficient in the subregion.

8.2.2. Mauritius has an important role to play in the promotion of subregional industrial development projects. On the one hand, it has no mineral resources and must therefore rely on mineral inputs from other PTA countries. On the other hand, the subregion can benefit more from its relatively advanced technological position and provide the much required market for Mauritian products. Very little is known in other PTA countries of Mauritius' potentialities as a major subregional industrial base.

8.2.3. Apart from the Cement project, the Iron and Steel Works in Mauritius can be expanded to cater for some of the specialised down-stream requirements of the industry in the subregion.

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*Please see Annex B.1. for detailed Project Profile.

III. ASSESSMENT ON IDDA SUB-SECTORAL BASIS

1. Agro-Industry

1.1. It seems as if the PTA Secretariat gives SADCC privilege in promoting Agro-based industries. The latter is actively engaged in rehabilitating and promoting textile, paper and pulp, and farm implement industries while PTA is engaged in promoting Irrigation Equipment.* This is a healthy complementary approach attained by expediency rather than by design. Agro-based industries tend to be more of small-scale processing to meet local consumption. Both PTA and SADCC are more interested in subregional large-scale projects that can take advantage of the larger and more varied market endowment factors and resources covering more than one member-country. Nevertheless, a number of gaps still exist.

1.2. In this respect, the Consultant recommends :

(a) the promotion of the manufacturing of Industrial Starch and Glucose (from maize and cassava) for which a large market exists in the subregion;

(b) the full utilisation and transfer of the advanced technology attained in Mauritius to other sugar-producing countries especially in the development of various by-products like Rhum, Molasses, etc. and the manufacture of machinery and equipment needed by the sugar industry.

2. Building and Construction

2.1. There is no reason why the subregion cannot be nearly, if not completely, self-sufficient in this sector. Apart from abundant timber, various building mineral materials exist (as shown in Table I) in the subregion. Far from exploiting fully deposits like clay, gypsum, asbestos and limestone, there is little or no information on the types and quality of these deposits.

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*Please see Annex A for detailed Project Profile.

It is believed that with some research into the substitution of imported materials, the subregion can become completely self-sufficient in this sector within a short time. Success in this sector can be of greater direct benefits to the people than similar success in other economic sectors, and raise living standards considerably. The intensification of more research and promotional activities on the use of local materials is therefore strongly recommended.

2.2. Glass-Sheet projects* submitted by Madagascar (if found to be viable) and Zambia are recommended for support in spite of the various projects in the pipeline in Tanzania, Zambabwe and Kenya in view of the size of the subregional market.

2.3. Similarly, the Cement project** in Mauritius is endorsed for support.

3. Metallurgical Sector

3.1. General: The subregion is blessed with a wide range of mineral deposits most of which are grossly under-exploited or not at all exploited. Many of those exploited undergo little or no processing before exporting. Table I shows the considerable number of minerals in only eight PTA countries visited by the Consultant and the nature of subregional industrial projects that can be developed.

3.2. Iron and Steel

The importance attached to this sector in the industrial development programme of the subregion has often been re-echoed at the meetings of PTA Ministers of Industry. A study of the prevailing situation of the industry

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* Please see Annexes B.1 and F.1 for detailed Investment Project Profiles.

**Please see Annex B.2. for detailed Investment Project Profile.

and the future market requirements demand support for a second Integrated Iron and Steel Plant (apart from Zisco steel in Zimbabwe) and the establishment of specialised and complementary Rolling Mills as and when they are considered economically viable in member-States. In view of the excellent endowment factors for this project, Uganda* is proposed for the second Iron and Steel Plant. The Zambian** proposal for a rolling mill is accordingly endorsed.

3.3. Copper Fabrication

Copper is second in importance with far-reaching effect on the development of a wide range of industrial activities including telecommunications, electronics, etc. A fuller development in the processing of the product is recommended and the proposed Copper Fabrication Plant to produce plates and strips in Zambia*** is endorsed.

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*Please See Annex C.1. for detailed Investment Project Profile.

**Please See Annex C.2. for detailed Investment Project Profile.

***Please See Annex F.3. for detailed Invesemtne Project Profile.

TABLE I - MINERAL RESOURCES - EXTENT OF EXPLOITATION AND INDUSTRIAL POTENTIALS

MINERAL RESOURCES	ETHIOPIA	KENYA	MADAGASCAR	MAURITIUS	TANZANIA	UGANDA	ZAMBIA	ZIMBABWE	POSSIBLE SUB-REGIONAL INDUSTRIAL PROJECT(S)	REMARK
1. Antimony								✓		For chemical & various metallic uses
2. Amethyst							X			For ornamental uses & Jewelry
3. Apatite (See Phosphates)						✓		✓	1. Phosphate Fertilizer 2. Phosphorous for Matches 3. Phosphoric Acid used in chemical industry.	High quality deposits in Uganda
4. Asbestos								✓	Asbestos Cement	For building
5. Bauxite			X						Aluminium plant for household utensils, building & construction, packaging, for Agriculture in construction of silos & irrigation equipment	
6. Calcite							X		Optical instruments	
7. Cassiterite (See Tin)					✓				Production of Tin	
8. Chromite Ore			X					✓		Extensive metallurgical uses; strengthening of metals, chrome plating etc, and chemical uses.
9. Clay	X	X	X	X	X	X	X	✓	Ceramics; Building Bricks; Refactory plant.	A survey of the types and qualities of deposits necessary.

NOTE: ✓ = Exploited

X = Unexploited.

✓ = Under-exploited.

MINERAL RESOURCES	ETHIOPIA	KENYA	MADAGASCAR	MAURITIUS	TANZANIA	UGANDA	ZAMBIA	ZIMBABWE	POSSIBLE SUB-REGIONAL INDUSTRIAL PROJECT(S)	REMARK
10. Coal			X		✓		✓	✓		Useful source of energy, coke for iron & steel, amonic, tal & dyes.
11. Cobalt							✓			
12. Copper	✓					X	✓	✓	Copper & copper alloy products (cables, wires etc) transformers; Zambia: Copper wire drawing; enamel wire plant; copper fabrication	Copper sheets and several other processed intermediate goods not produced in the sub-region.
13. Coral Sand				X					Cement	To be exploited in Mauritius
14. Corundum								✓		—
15. Diamond					✓					
16. Diatomite		✓							Moulding material	
17. Feldspar							✓		Porcellain, ceramics, glazes.	
18. Fluorspar		✓								Used in making portland cement & various other uses.
19. Gold	✓	✓	✓		✓		✓	✓		Well exploited
20. Graphite			✓							Used in making pencils, brake linings, batteries, and lubricants.
21. Gypsum	X									Building material Plaster of Paris etc

MINERAL RESOURCES	ETHIOPIA	KENYA	MADAGASCAR	MAURITIUS	TANZANIA	UGANDA	ZAMBIA	ZIMBABWE	POSSIBLE SUB-REGIONAL INDUSTRIAL PORJECT(S)	REMARK
22. Iron Ore			X		X	X	X	✓	Iron & Steel products. Zambia: Irrigation equipment. Zimbabwe: Iron & Steel Plant (ZISCOSTEEL); Agric. machinery and equipment (TINTO) Uganda: Steel Rolling Mill plant	Uganda ore is one of the best in Africa.
23. Lead							✓		1. Batteries 2. Containers for reactive chemicals.	
24. Lime							X		Building material applications: mason's lime; furnishing lime; masonry mortar.	Useful in the metallurgical industry.
25. Limestone	✓	✓	✓		✓	✓	✓	✓	Cement	Exploited for Cement.
26. Lithium								✓		Useful for alloys and as compounds for various uses.
27. Magnesite				X				✓		Well exploited in Zimbabwe; used for refractory bricks & various magnesium chemicals.
28. Mica			X	X						Useful in Building & Cons. Industry.
29. Natural Gas				X		X			Urea-ammonia for nitrogenous fertilizer.	Action taken to exploit in Tanzania.
30. Nickel								✓		Used as pure metal and alloys.
31. Optical Quartz			X						Optical purposes	

MINERAL RESOURCES	ETHIOPIA	KENYA	MADAGASCAR	MAURITIUS	TANZANIA	UGANDA	ZAMBIA	ZIMBABWE	POSSIBLE SUB-REGIONAL INDUSTRIAL PORJECT(S)	REMARK
32. Phosphates					✓	X	X	✓	Phosphate fertilizer (SSP & TSP) Sulphuric acid: Zimbabwe: Phosphate fertilizer plant	
33. Phyllite							X			Inferior building material.
34. Platinum	✓							X	Alloys and catalysts	Exploited in Ethiopia.
35. Potash	X								Potash Fertiliser	A major fertilizer product.
36. *Precious Stones			✓		✓	✓	✓	✓		Craftwork, Jewelry.
37. Salt	✓	✓	✓		✓	✓			Table Salt, manufacture of Sodium bicarbonate, bleaching powder, chlorine, etc.	
38. Silicate/ Silicon		X					X			Used in ceramic industry.
39. Silver		X			✓		✓	✓		Exploited in Zambia and Zimbabwe. Production negligible in Tanzania.
40. Soda Ash (Anhydrous Carbonate $Na_2 CO_3$)	X	✓			✓				- Glass - Caustic Soda, Soap. Tanzania: Glass (bottle) plant	Exploited in Kenya and Tanzania.
41. Talc							X			Various uses.

* Precious Stones - celestite, quartz, tourmaline, fossilized wood, agate, beryl, rhodonite, aragonite, chalcosite, etc.

MINERAL RESOURCES	ETHIOPIA	KENYA	MADAGASCAR	MAURITIUS	TANZANIA	UGANDA	ZAMBIA	ZIMBABWE	POSSIBLE SUB-REGIONAL INDUSTRIAL PROJECT(S)	REMARK
42. Tantallite								✓		Various minor uses.
43. Tin					X	X	X	✓	Alloys	Used for plating.
44. Tourmaline							X			Used as Gem-stones.
45. Tungsten						X				High speed cutting tools, tungsten steels; X-Ray tubes.
46. Uranothoria-nite			X							Used in nuclear energy industry.
47. Wolfram						✓			(See Tungsten)	
48. Zinc							✓		Zinc coatings; Roofing and other building purposes; dry battery cans.	

4. Chemical/Fertilizer Industry

4.1. Fertilizer industry has also been accorded very high priority in the subregion in view of its possible impact on agricultural production and productivity. The proposed Phosphate and Potash projects in Uganda and Ethiopia respectively are endorsed.* With the proposed Urea/Amonia project in Tanzania, the subregion should become self-sufficient in fertilizers.

4.2. Caustic Soda**

The first Caustic Soda plant of its kind in the subregion is endorsed for production in Kenya using the chemical process and the abundant deposit of Soda Ash as a major input. The product is a major input in the manufacture of soap and detergents, and widely used in food-processing, textiles and pulp and paper industries.

4.2.1. The Government has given permission to a number of private companies to manufacture a limited quantity of caustic soda by the electrolysis method. The major inputs are sodium chloride (common salt) and an enormous amount of electric power which is relatively expensive in Kenya. A significant by-product of this method is chlorine which is :

(a) needed in very small quantities in the pharmaceutical industry and for water treatment;

(b) very difficult to transport or dispose of.

The viability of the electrolysis method depends largely on the market for chlorine, the demand of which is minimal in the subregion.

4.3. Petrochemical

With the discovery of natural gas in Tanzania, it is recommended that PTA should initiate ways and means of exploiting the product by the establishment of a petrochemical complex. Such an industry will open the subregion to a wide new field of unparalleled industrial opportunities.

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*Please refer to Annexes D.1 & 2. for detailed Investment Project Profiles.
** Please refer to Annex D.3. for detailed Investment Project Profile.

4.4. Pharmaceuticals

All Pharmaceutical plants in the subregion are either closed down or working under 40% capacity because they rely entirely on imports for their inputs. The volume of imports of drugs and pharmaceuticals is enormous. The importance of these products to health and productivity cannot be gainsaid. Consequently, the UNECA has, for quite some time, been planning to carry out a survey of active pharmaceutical ingredients in the region that can be utilised as inputs as soon as funds become available. It is recommended that PTA and UNIDO participate in this grandiose scheme.

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*Please refer to Annex E for detailed Investment Project Profile.

IV. ASSESSMENT OF SUB-REGIONAL PROJECTS

1. Selected Projects for UNIDO/PTA Support Within IDDA Framework

At a meeting held between UNIDO representatives and the staff of the PTA Secretariat, it was agreed that the exercise on project preparation would concentrate on ten priority projects which have, except for the Zambian Rolling Mill project, emanated from the integrated industrial promotion programme for the Eastern and Southern African sub-region adopted at the sub-regional meeting organised by UNIDO, in co-operation with the O.A.U. and E.C.A. in Addis Ababa in November, 1983, within the framework of the I.D.D.A. The projects are as follows :

1. Rehabilitation of a Rolling Mill (Uganda)
   (Replaced by an Integrated Iron and Steel Plant)
2. Establishment of a Steel Rolling Mill (Zambia)
3. Manufacture of Irrigation Equipment (Zambia)
4. Manufacture of Transformers (Zambia)
5. Manufacture of Potash Fertilizer (Ethiopia)
6. Manufacture of Phosphate Fertilizer (Uganda)
7. Manufacture of Phosphate Fertilizer (Zimbabwe)
8. Manufacture of Caustic Soda (Kenya)
9. Manufacture of Sheet-Glass (Madagascar)
10. Manufacture of Cement (Mauritius).

The Zimbabwe Government later withdrew the submission of the Phosphate Fertilizer project. There are therefore nine selected projects on which Investment Project Profiles have been prepared for UNIDO/PTA support within IDDA framework. The Uganda Government has expressed preference for developing a fully integrated Iron and Steel project in place of the Rehabilitation of the Rolling Mill which Ziscosteel of Zimbabwe is looking into. Besides, the major problem of the Rolling Mill is shortage of inputs which can be solved by the mining and development of the rich iron ore deposits in Uganda.

The nine projects can be categorised under the major IDDA priority sub-sectors as follows :

A. Agro-Industry:

Manufacture of Irrigation Equipment (Zambia)

B. Building and Construction Industry

(i) Manufacture of Sheet-Glass (Madagascar)
(ii) Manufacture of Cement (Mauritius)

C. Metallurgical Industry

(i) Integrated Iron and Steel Plant (Uganda)
(ii) Establishment of a New Rolling Mill (Zambia)

D. Chemical/Fertilizer Industry

(i) Manufacture of Potash Fertilizer (Ethiopia)
(ii) Manufacture of Phosphate Fertilizer (Uganda)
(iii) Manufacture of Caustic Soda (Kenya)

E. Engineering Industry

Manufacture of Transformers (Zambia).

The selection of projects is drawn from all the priority sub-sectors and from six member-States of the PTA. Zambia and Uganda have 3 and 2 projects respectively; and Madagascar, Mauritius, Ethiopia and Kenya each has one project respectively. Each of these nine projects are considered below under the following three headings :

(i) Present Status; Total Investment and Capacity;

(ii) Contribution of the Project to the Implementation of the IDDA Programme;

(iii) Impact on the Overall Development of the Sub-Region.

2. Comments on Selected Projects

A. Manufacture of Irrigation Equipment (Zambia)
(An Investment Project Profile is at Annex A)

(i) Present Status, Capacity and Total Investment

(a) Status: The proposal has been under consideration since March, 1981 when a feasibility report on the project was submitted. The project has not yet been established mainly for financial reasons.

(b) Capacity: A production of 3,679 tons per annum of various irrigation equipment is planned.

(c) The Total Investment Cost (at 1982 cost) is K.15.2 million (i.e. about US$7 million).

(ii) Contribution to IDDA Programme

This project will enhance agricultural production and facilitate an all-year round production of most agricultural crops. With increased productivity and overall production in the agricultural sector, agro-based industries are expected to be more self-reliant on local inputs, and the nation will progress towards self-sufficiency in foood production. The project will also provide a means of utilising as inputs the products of the proposed steel rolling mill that is to be

established in Zambia. A striking feature of this project therefore is the strong linkage between industry, agriculture and other sectors of the economy. Eventually, it is expected that the iron and steel to be used as inputs will not only be processed through the rolling mill of Zambia but also originate from the deposits of iron ore in the country.

The products can also be used in the mines and as Intermediate and/or Capital goods for water resources development.

(iii) Impact on Overall Development

In a sub-region that is stricken with drought, the impact of irrigation and irrigation facilities cannot be over-estimated. As pointed out earlier, the sub-region is endowed with great lakes, rivers and other water resources that are grossly underutilised. The production of irrigation equipment will facilitate fuller utilisation of these resources. It sill be the first project of its kind in the sub-region. Each succive conference of Ministers of the sub-region has consistently placed top priority on this project.

B.1. Manufacture of Glass-Sheets (Madagascar)
(An Investment Project Profile is at Annex B.1.).

(i) Present Status, Capacity and Total Investment

(a) Status: There is no up-to-date study of this project. The Government has requested a fresh study on the viability of the project. Any further action will depend on the outcome of the study.

(b) Capacity: 10,000 tons per annum.

(c) Total Investment Cost: US$8 million (at 1976 cost).

(ii) Contribution to IDDA Programme:

Glass-Sheet is used extensively in the Building and Construction Industry. It is also used in other sectors of the economy, for example, in the automobile industry as windscreen, etc. A major proportion of the product used in the sub-region is presently imported from South Africa.

The rationale for proposing this project is based on the fact that all the raw materials especially soda ash is available in the sub-region. The need to be self-reliant therefore dictates the establishment of a glass-sheet industry in two or three of the member-countries of PTA. This will save the sub-region considerable foreign exchange and unnecessary reliance on South Africa. It will also provide the necessary inputs for a number of industries already established in various member-States of the sub-region.

(iii) Impact on Overall Development

The establishment of a Glass-Sheet industry will be a major step-forward in the building and construction industries of the various economies of the sub-region and foster the growth of various industries requiring glass-sheet as input.

B.2. Manufacture of Cement (Mauritius)
(An Investment Project Profile is at Annex B.2.).

(i) Present Status, Capacity and Total Investment

(a) Status: As in the case of Glass-Sheet, the Government of Mauritius has requested a review of an out-of-date study undertaken as far back as 1973 following a change of location. As soon as the study is completed, a decision will be taken to proceed with the establishment of the project.

(b) Capacity: 300,000 tons of cement per annum is proposed

(c) Total Investment Cost: US$43.1 million at 1973 cost.

(ii) Contribution to IDDA Programme

The project will make Mauritius more self-reliant. It is important to note that the only worthwhile natural mineral deposit in Mauritius is coral sand which will be the major raw material input for this project. It will rely on other countries of the sub-region for other inputs like limestone, etc. Very little of its products will be exported since its present consumption (250,000 tons) is slightly less than the maximum capacity envisaged for the project.

(iii) Impact on Overall Development

Apart from relying on other member-countries for some raw material inputs, it will reduce the amount of cement presently imported to Mauritius at considerable transport cost. Cement is already being produced in Kenya, Tanzania, Zambia, Zimbabwe, Mozambique and Ethiopia.

C.1. Establishment of a New Rolling Mill in Zambia
(An Investment Project Profile is at Annex C.1.).

(i) Present Status, Capacity and Total Investment

(a) Status: This is a new enterprise still to be established.

(b) Capacity: 60,000 metric tons per year.

(c) Total Investment Cost: US$22.56 million.

(ii) Contribution to IDDA Programme

The project is expected to provide inputs for infrastructure, the building/construction and engineering industries. It will also provide essential inputs for the proposed Irrigation Equipment project and foster the establishment and growth of a wide range of industries. It will rely on Ziscosteel for its major inputs and save a lot of foreign exchange.

(iii) Impact on Overall Development

It is part of an integrated strategy for the development of Iron and Steel in the sub-region. The strategy consists of the development of two integrated Iron and Steel plants at Zimbabwe

and eventually Uganda respectively; and a number of specialised rolling mills in Zambia, Kenya, Uganda and other member-countries particularly those with enough local market and resources to make such projects viable and complementary.

C.2. Establishment of Iron and Steel Plant (Uganda)
(An Investment Project Profile is at Annex C.2.).

(i) Present Status, Capacity and Total Investment

The Government of Uganda feels that with the assistance presently given by Ziscosteel and UNIDO, the existing Rolling Mill needs no rehabilitation. The problem of the Rolling Mill is to find necessary raw materials in the form of billets or scraps to feed the existing establishment. Instead, the Government wishes to develop its iron and steel industry since it has the richest iron ore in the sub-region (Fe 68 - 90%). It also has gas and coke necessary for smelting the iron ore. A full study on the project still needs to be undertaken. Until this is completed, no meaningful data can be provided. However, in view of the rich resources available in Uganda, serious attention should be given to the development of an Integrated Iron and Steel Plant to supplement Ziscosteel which has almost reached its maximum capacity. This will take years to attain.

(ii) Contribution to IDDA Programme

The contribution of this proposal is immense. The proposed Integrated Iron and Steel project will provide necessary inputs for the existing Rolling Mill at Jinja and Kenya. More importantly, a second major Iron and Steel project in the sub-region to supplement and/or complement Ziscosteel of Zimbabwe in view of :

1. the cost of transportation of billets from Zimbabwe;
2. the limitations of Ziscosteel which cannot exceed the existing capacity of 1.3 million tons; and
3. the fact that Ziscosteel relies on iron ore of a much poorer quality to those in existence in Uganda.

Uganda and neighbouring countries like Kenya, Rwanda, Burundi, etc. will become self-reliant. In addition, it will have considerable forward linkages in the promotion of domestic industries like agricultural implements, hand tools, which will require steel as inputs. Finally, it is an important source of producing intermediate and capital goods in virtually all sectors of the economy.

(iii) Impact on Overall Development

With the establishment of an Integrated Iron and Steel industry to supplement and/or complement Ziscosteel, the entire sub-region will eventually become self-sufficient in iron and steel. It is a project which requires detailed preparation and close co-operation from all the neighbouring countries as it will serve as the foundation on which to build a wide range of industries covering various sectors and producing goods for local consumption. The numerous Rolling Mills and downstream steel industries in Kenya will benefit most from the project.

D.1. Manufacture of Potash Fertilizer (Ethiopia)
(An Investment Project Profile is at Annex D.1.)

(i) Present Status, Capacity and Total Investment

(a) Status: The project has been in the pipeline since 1958. Various attempts have been made to develop the rich deposit of potash in Ethiopia. The project is still to be established.

(b) Capacity: 1.5 million tons of potash and chloride per annum.

(c) Total Investment Cost: US$300 million.

(ii) Contribution to IDDA Programme

The project will make the sub-region entirely self-sufficient in potash fertilizer which is considered important in agriculture. A substantial proportion of the product will be exported and this would provide considerable foreign exchange earnings and foster the growth of agro-based industries.

(iii) Impact on Overall Development

The sub-region is noted for using very little fertilizers as compared to other regions of the world. It is expected therefore that the potash to be produced will provide the necessary inputs for the various fertilizer projects in the sub-region and enhance agricultural productivity and production. This is an important project in view of the emphasis placed on agriculture.

D.2. Manufacture of Phosphate Fertilizer (Uganda)
(An Investment Project Profile is at Annex D.2.).

(i) Present Status, Capacity and Total Investment

(a) Status: It is proposed to re-establish this project which went out of production during the Civil war in Uganda.

(b) Capacity: A production capacity of 50,000 tons of Single Super-Phosphate (SSP) per year is proposed.

(c) Total Investment Cost: US$97 million.

(ii) Contribution to IDDA Programme

The project will enhance agricultural production and productivity in the sub-region. It will also provide part of the required inputs for the various fertilizer projects in the sub-region and therefore make the sub-region more self-sufficient.

(iii) Impact on Overall Development

On the advice of the World Bank, the project will be limited to the production of Single Super Phosphate (SSP) fertilizer only. Other member-countries are disappointed because they require Triple Super Phosphate (TSP) and the various fertilizer projects have been geared towards the use of Triple Super Phosphate (TSP). Although the installations proposed for the project are supposed to be simple and the capacity is only 50,000 tons, the total investment cost is over US$97 million. Costs of demolition, freight, pre-operating expenses, provision for inflation and interests take over two-thirds of the total investment.

D.3. Manufacture of Caustic Soda (Kenya)
(An Investment Project Profile is at Annex D.3.).

(i) Present Status, Capacity and Total Investment

(a) Status: The project has been under consideration since 1976. Indecision on the choice of technology between two different processes, each with its implications, has delayed action.

(b) Capacity: The production of 30,000 tons of caustic soda per annum utilising the chemical process is proposed.

(c) Total Investment Cost: US$6.58 million (at 1978 cost).

(ii) Contribution to IDDA Programme

This will be the first project of its kind in the sub-region. It will provide the various inputs required for the production of soap and detergents, food-processing, textiles and pulp and paper. These are all core industries under the IDDA programme. The impact of the project on the various priority sub-sectors will cover the entire sub-region.

(iii) Impact on Overall Development

It will make the sub-region completely self-reliant insofar as caustic soda is concerned. Caustic Soda is a major intermediate product for several other industries. It will therefore foster the establishment of other industries referred to above and enhance a more self-sustaining economy.

E. Manufacture of Transformers (Zambia)
An Investment Project Profile is at Annex E).

(i) Present Status, Capacity and Total Investment

(a) Status: This is a new project still to be established.

(b) Capacity: A production capacity of 1,260 Distribution Transformers and 3,600 units of Electric Motors per annum is estimated.

(c) Total Investment Cost: K.6 million (about US$2.7 million).

(ii) Contribution to IDDA Programme

It has substantial backward linkage effect in that it is going to rely on copper and aluminium produced locally. It will also foster the distribution of electric power and the growth of electronic industries in the sub-region. It is significant, technology-wise.

(iii) Impact on Overall Development

This will be the first industry of its type to be established in the sub-region, although proposals exist for the establishment of similar projects in Kenya.

3. Observations on Other Sub-Regional Projects Submitted for PTA Support

Investment Project Profiles are at Annexes F.1 to 3 in respect of the following three projects which have been submitted to the PTA Secretariat : for support :

1. Project Profile on Glass-Sheet Industry (Zambia)
2. Project Profile on Hand Tools and Cutlery Plant (Ethiopia)
3. Project Profile on Copper Fabrication in Zambia.

(1) Glass-Sheet Industry (Zambia)
(An Investment Project Profile is at Annex F.1.)

This is a project proposal which has been fully substantiated by a feasibility study. The capacity proposed is 10,000 tons per annum and estimated at K.57 million or US$25.6 million.

Unlike Madagascar, Glass-Sheet project, a complete and up-dated study on this project is available and the Government is determined to implement the project as soon as funds become available. On the other hand, the major raw material (soda ash and sodium sulphate) are not available in Zambia. They are therefore in a similar situation as Madagascar in respect of the availability of raw material inputs. A logical location of a project of this nature would appear to be Kenya or Tanzania which has considerable deposit of soda ash. Nevertheless, the market situation is large enough to accommodate Glass-Sheet production in Madagascar, Tanzania, Kenya and Zambia. The fragile nature of the product especially for transportation also encourages the establishment of plants in various parts of the sub-region.

(2) Manufacture of Hand Tools and Cutlery (Ethiopia)
(An Investment Project Profile is at Annex F.2.).

This is a project proposal on which only a preliminary study has been carried out. The total capacity envisaged is 1.6 million pieces of industrial hand tools and 600,000 pieces of domestic cutlery

per annum. The total investment cost envisaged is about Eth. Birr 27 million or US$11.64 million.

It is expected that the major raw material inputs will come from the sub-region. The project will have considerable impact on the various industries requireing tools in the sub-region. However, the preliminary study undertaken shows that the project will not be profitable until 10 years after production. The establishment of a project of this nature is likely to be more profitable if it is located in an iron and steel producing country like Zimbabwe.

(3) Establishment of a Copper Fabrication Plant (Zambia)
(An Investment Project Profile is at Annex F.3).

A fabrication plant for copper rods and cables exists in Zambia. The proposed plant will produce copper plates and strips in coil output of 10,000 tons per year with 0.5 to 2.00 thickness. The total investment cost is about US$49 million. As at the moment, copper plates and strips are imported from Europe. The establishment of the project will therefore make the sub-region more self-sufficient in copper products and increase foreign exchange earnings from the exportation of its products.

V. CONCLUSION

1. The total investment costs of the above described projects excluding the Iron and Steel Project (Uganda) is about US$ 486.94m. At current cost, it is estimated at over US$ 600 million. Most of the projects are completely new in the sub-region requiring the acquisition of new technologies and skills. Implementation of these projects will, therefore, require the mobilization of resources at:

(a) the national level

(b) the sub-regional (PTA) level

(c) the international level.

An essential feature of these projects is that they are sub-regional and therefore require the co-operation of some if not all PTA member-States in the implementation of each project. The feasibility of many of the projects depends on the sub-regional market and the ensuing benefits to be derived from economics of scale, and the availability of raw material inputs and other resources from one or more countries.

2. The 9 selected projects are only a few of the hundreds of possible sub-regional projects bearing in mind that well over 50 valuable mineral deposits in the sub-region are far from being fully exploited industrially. It is considered reasonable to select a few projects at a time for implementation in view of the limited capital and other resources available and the management capacity to ensure successful implementation. The purpose of this Working Document is to provide necessary background information and project profiles for an Inter-Agency Meeting that is expected to establish a strategy for the promotion of these projects amongst, prospective external investors, industrialists and financiers whose collaboration could take the following forms :

(1) Establishment of joint ventures through equity participation
(2) Financing through medium and long-term loans
(3) Acquisition of know-how and technology
(4) Managerial and technical training
(5) Access to foreign markets.

3. To achieve an effective implementation of these projects and of the PTA Industrial Programme, the Industry Division of the Secretariat needs to be strengthened:

(i) to cope with the collosal problem of collection, analysis and dissemination of industrial data and information from the widely spread member-countries;

(ii) to develop an effective and persuasive liaison function in order to foster close co-operation and understanding amongst the member-nations;

(iii) to serve as a resource unit for sub-regional industrial promotion that can advise, provide assistance, secure finance, market and expertise, within and outside the sub-region.

4. The Division would need to have properly staffed and specialized Sections to promote and co-ordinate activities in the following priority sectors: Agro-Industry, Building and Construction, Metallurgical, and Chemical/Fertilizers. It will be important for these sections to keep abreast with the activities of various organizations like UNECA, MULPOC, SADCC, Eastern and Southern African Mineral Resources Development Centre (ESAMRDC) and a host of other sub-regional as well as regional and national organizations.

It is recommended that the Division be informed of all technical assistance proposals and programmes relating to sub-regional industrial projects.

A N N E X E S

ANNEX A

INDUSTRIAL INVESTMENT PROJECT PROFILE

Project Title: MANUFACTURE OF IRRIGATION EQUIPMENT

Country: Z A M B I A.

A. BACKGROUND INFORMATION

The project idea emanated from the economic objectives of the Zambian Government as expressed in the Third National Development Plan, 1979 - 1983. The main features of its new industrialisation strategy were, among others, balanced development having regard to linkages between industry, agriculture and other sectors of the economy; and the import-substitution and export-orientation by the establishment of industries based on the maximum use of local minerals and materials.

The development of irrigation resources was then seen as a major infrastructure for an all-year round production of particular crops and agriculture generally. In this connection, pumps and irrigation equipment project was identified and recommended for launching during the Third National Development Plan (by private investors, co-operatives and parastatals).

It was to be established on a small- or medium-scale industry level in the category of industries based on local mineral resources and for manufacturing capital and intermediate goods.

Initial investigations include: The Report of a Joint FAO/German/ Dutch Consultancy Mission on Irrigation Potential of Zambia in 1979 and a Preliminary Inventory of Irrigation Development in Zambia by C.A. Lewy in 1979.

In 1980, the Zambian Government, working through its Ministry of Agriculture and Water Development requested UNIDO to undertake a Feasibility Study on the production of irrigation equipment in Zambia. Consequently, UNIDO invited Polytechna Praha of Czechoslovakia to undertake this study. The team visited Zambia in October, 1980 and in March, 1981, submitted a final feasibility report on the production of irrigation equipment.

B. COMPETITORS

Competition Outside the Sub-Region comes mostly from manufacturers in the industrialised world. Hand operated pumps are imported into Zambia mostly by Prago Limited, Robert Hudson (Zambia) and by E.W. Tarry. The largest importer of deep-well pumps is R. Hudson who handles more than half of the total imports and supplies these practically only to the mining industry. Imports of deep-well pumps in 1980 totalled 600 units. The figure is estimated at about 800 in 1984.

Competitors Within the Sub-Region Hand-operated pumps are already being manufactured in Zambia by the Irrigation Pumps Company which by 1980 made 300 simple hand-operated pumps annually. It is estimated that in 1980 some 300 pumps were made in this way. Kenya also has plans for producing pumps for irrigation projects in the future.

C. INFORMATION ON THE PROJECT

1. Technical Aspects

1.1. Status of Project: It is a new enterprise

1.2. Products to be manufactured :

Pumping units, flanged suction pipe, flanged elbow, suction strainer with flange, irrigation suction pipe, closing valve, connection piece, sprinkler closing element.

1.3. Main Input Materials :

Steel profiles, sheets and pipes, grey iron castings, aluminium and copper alloy castings, pipe aluminium alloys, copper alloys, components of rubber, plastics and leather, electric motors and electric instruments, fittings and pressure guages.

1.4. Market (Export, Local) :

1.4.1. - Export to Eastern and Southern African countries.

- Locally pumping sets are used not only in agriculture but also in industry, in homes, for supply of water to dwelling houses and other buildings. Table overleaf shows the number of and types of pumps imported into Zambia between 1978 and 1980.

TYPE OF PUMP	1978 (UNITS)	1980 (UNITS)
Hand-Operated Pumps	1,800	1,560
Deep-Well Pumps	N/A	690
Centrifugal Pumps	N/A	410

In Kenya, the number of pumping units imported in 1979 were as follows :

(a) 5,594 units for liquids

(b) 660 units for gases.

In spite of the imports, the demand for irrigation equipment is still unsatisfied. Table below shows figures of unsatisfied demand in Zambia :

TYPE OF PUMP	1978	1980
Hand-Operated Pumps	80	200
Centrifugal Pumps	N/A	180

In Ethiopia, the local demand for centrifugal pumps is 1,500, and for hand pumps 3,000.

1.4.2. Demand: The figures of imports and local production indicate existence of unsatisfied demand for irrigation equipment in Zambia. Table below shows the consumption of irrigation equipment in 1978 and 1980 as well as projected demand till 1990 :

TYPE OF EQUIPMENT	1978	1980	1990 (PROJECTED)
Hand-Operated Pumps	1,880	2,360	4,880
Deep-Well Pumps	N/A	690	1,080
Centrifugal Pumps	N/A	590	2,250
T O T A L	1,880	3,640	8,210

1.4.3. Growth in Demand: The utilization of hand-operated pumps on a larger scale in Zambia is envisaged for other applications particularly for water supply to villages or to individual apartment houses. Kenya offers a potential market area in view of the large imports of pumps into that country. Pumps from the plant could be supplied as replacements and substitutes for the ones imported into Kenya from outside the region. Ethiopia also offers a potential market although they are anxious to establish their own plant.

1.5. Plant Capacity and Manufacturing Process :

Plant Capacity: A production capacity of 3,679 tons per annum is estimated.

Manufacturing Process:

The manufacturing of irrigation equipment involves cutting of materials, machining, chamfering of machined or pressed parts, heat treatment of components, surface treatment, mounting of joints on tubes, assembling and testing.

1.6. ANNUAL PRODUCTION

1.6.1. An operation period of 15 years is planned. Plant will start production in Year 3 i.e. 2 years after implementation. The production programme envisages that the plant will operate at a capacity of 20% in Year 3 and reach a capacity of 60%, 80% and 100% in Years 5, 6 and 8 respectively.

YEAR	ANNUAL TURNOVER (K'000)
3	5,480
4	10,960
5	16,440
6	21,920
7	24,650
8	27,400
'	'
'	'
'	'
15	27,400

1.6.2. Pricing Policy:

The selling price per ton of equipment is assumed to be K.7,450.00.

1.7. Availability of Manpower, Raw Materials and Utilities (power, water):

The majority of the materials and inputs will be imported (69.2% of tonnage, 84% of costs). It is supposed that many of these materials and inputs will be produced in Zambia in the near future (i.e. steel pipes, rolled steel castings, aluminium alloys). This will give considerable scope for backward linkages.

About 5 - 6 foreign experts will be needed in the first period of start-up. Power and water supply are available in sufficient quantities.

Cost of Inputs - Cost of inputs will greatly influence the total cost of production especially as much of the inputs will be imported. At full capacity the total cost of production is estimated at K18,670,000.

1.8. Plant Location and Availability of Infrastructural Facilities

Although the Zambian authorities have not yet decided on the site or location of the proposed plant, it is suggested that it be sited in the most populated belt starting from the Eastern Province to the Copper Belt Province. The infrastructure (power supply, transport, etc.) in this area is highly developed.

2. FINANCIAL ASPECTS

2.1. Total Investment Costs:

Total project cost, broken down into land, construction, installed equipment and working capital, indicating foreign exchange component :

	Local Currency Component (K'000)	Foreign Currency Component (K'000)	Total (K'000)
A. FIXED INVESTMENT:			
Land	-	-	-
Site Development	110	-	110
Structures & Civil Works	1,860	-	1,860
Plant Machinery and Equipment	608	6,502	7,110
Technology Costs Lump-sum Payments	-	120	120
B. PRE-PRODUCTION CAPITAL EXPENSES	950	680	1,630
C. WORKING CAPITAL (AT FULL CAPACITY)	4,290	-	4,290
TOTAL INVESTMENT COSTS	7,818	7,302	15,120

Project Financing: Proposed financial structure indicating expected sources and terms of equity and loans.

The operating company's capital structure is assumed to be based on a debt equity ratio of 1.3:1

Long-term loans are assumed to carry an interest rate of 8% per annum, collaborators deferred credits, 9% while short-term loans, overdrafts are assumed to carry about 9% rate of interest.

	Local Sources (K'000)	Foreign Sources (K'000)	Total (K'000)
Equity	4,400	2,600	7,000
Long-term Loans	1,490	2,130	3,620
Deferred Credits for Supply of Equipment and Know-how.	-	4,500	4,500
Short-Term Loans, Overdrafts	1,150	-	1,150
T O T A L	7,040	9,230	16,270

Information on Profitability and Return on Investment :

Assuming a 'net book' FOB value of K7,450 per ton of equipment,

- Simple Rate of Return on Equity = 63.8%
- Simple Rate of Return on Total Capital = 29.5%
- Payback period works out to be $6\frac{1}{4}$ years
- Break-even capacity is around 36.4%.

3. Foreign Contribution Desired:

Equity participation and loans will be required.

A joint-venture proposal with a country with the necessary know-how and technology and with easy access to sources of input is essential. Access to foreign markets outside the PTA Sub-region is not necessary since the demand within the sub-region cannot be met in the foreseeable future.

4. Project Study Available:

A Feasibility Study is available.

D. GENERAL REMARKS

This is a project that has been of particular interest at every Ministers of Industries Conference. There is a commitment to the project in spite of the large foreign in-put in raw materials. It is understood at the E.C.A. that the North Koreans are anxious to support projects of this nature.

ANNEX B.1.

INDUSTRIAL INVESTMENT PROJECT PROFILE

Project Title: MANUFACTURE OF GLASS-SHEET

Country: MADAGASCAR.

A. BACKGROUND INFORMATION

A study undertaken in September 1976 on the feasibility of establishing a Glass Sheet manufacturing plant in Madagascar concluded that the local consumption was insufficient to maintain an economically viable factory and proposed a review of the project ten years later. With the establishment of the Preferential Trade Area and the Economic Commission of Islands in the Indian Ocean, the Government has proposed a review of the project and requested UNIDO assistance in providing an expert to review the study and advise on its implementation. until this review is undertaken and the exercise proves positive, the Government does not consider it necessary to take any further action.

It is therefore important to note that this Project Profile is based more on the 1976 study for what it may be worth and whatever information is readily available.

B. INFORMATION ON THE PROJECT

1. Technical Aspects

1.1. Status of Projects: The project is still under consideration. A decision on the subject will depend on the outcome of a review of the 1976 study.

1.2. Product(s) to be Manufactured:

Glass Sheets of various thickness.

1.3. Main Input Materials:

(i) Soda Ash : To be imported from Kenya (within the sub-region).

(ii) Dolomite : Excellent quality exists locally in large quantity.

(iii) Limestone : This is also available locally in large quantity.

(iv) Sodium Sulphate: To be imported.

(v) Feldspar : Local deposits are already being exploited for ceramics.

(vi) Additives (for decolourisation)
(a) Selenium
(b) Cobalt oxide
} To be imported.

2. Salient Features of Feasibility Study:

2.1. Capacity: 10,000 tons annually.

2.2. Location: Tamatave, North East Coast of Madagascar. It is the main port.

2.3. Technology: Various technological processes were considered. The Fourcault process was considered most appropriate because of its relative simplicity.

2.4.2. Annual Production: It will take 8 years to achieve total capacity of 10,000 tons annually.

2.4.3. Expected Output: This will depend on actual demand, the availability of all the inputs, and the proposed review of the project.

2.5. Pricing Policy: A competitive price that will compare favourably with imported Glass Sheet will have to be fixed since over 80% of its products will have to be exported.

3. MARKET (Export, Local)

3.1. Local: Estimated annual demand for Glass Sheet in Madagascar is only 2,000 tons and, in the other Indian Ocean Islands, only 3,000 tons. It is therefore considered more as an export oriented project.

3.2. Export Market: The total estimated demand in the sub region in 1983 is 46,800 tons annually made up as follows:

Kenya	10,700
Tanzania	8,000
Uganda	2,200
Ethiopia	6,000
Zambia	4,000
Zimbabwe	5,400
Mozambique	2,000
Other Indian Ocean Islands	3,000
Other PTA Countries	3,500
TOTAL	46,800

Competition within the sub-region is expected from the proposed 15,000 tons/yr plant in Tanzania to be commissioned in July, 1985 and later from Zambia (12,000 tons/yr), Zimbabwe (14,000 tons/yr) and Kenya assuming that all these glass sheet projects materialise.

4. UTILITIES:

4.1. Power and Water Supply:

It was confirmed that power and water supply are readily available at reasonable cost.

4.2. Infrastructure:

The infrastructure in and around Tamatave is fairly good. However, the authorities are prepared to provide all infrastructural facilities, that do not exist at present, as soon as a decision to start the project is taken.

5. FINANCIAL ASPECTS

5.1. Total Investment Costs:

A total investment cost of FMG 2 billion (about $6 million) was proposed in 1976. This figure is most unrealistic under present day conditions. The entire financial aspects of the project will have to be revised after the review of the project.

5.2. Project Financing: To await review of project.

5.3. Financial Analysis

5.3.1. Debt Equity Ratio: This will depend on the study to be undertaken.

5.3.2. Profitability and Return on Investment:

(i) Payback Period
(ii) Internal Rate of Return on Total Capital
(iii) Break Even Point

) This will depend on the study to be undertaken.

6. EXTERNAL CONTRIBUTION DESIRED

(a) Equity Participation
(b) Joint Venture Participant
(c) Management Agreement
(d) Others

) A firm decision on these points will be taken on the completion of the study referred to above. In principle the Government will welcome participation if considered necessary.

7. PROJECT IMPLEMENTATION

Implementation decisions will depend on the outcome of the review of the feasibility study.

8. STUDIES AVAILABLE

A feasibility study dated September 1976 by Bureau de developpement et de promotion indus i.e. is available.

9. GENERAL REMARKS:

In spite of the smallness of the local market, the demand for Glass Sheet in the sub-region is high. That apart, the project will help to foster the building and construction industry and provide employment. It will also serve as a foreign exchange earner.

This project Profile could not be completed fully because the data available in the 1976 study were completely out of place. The proposed review will provide more meaningful data.

ANNEX B.2.

INDUSTRIAL INVESTMENT PROJECT PROFILE

Project Title: MANUFACTURE OF CEMENT

Country: MAURITIUS.

A. BACKGROUND INFORMATION

Cement production is considered by the Government of Mauritius as vital to the industrial development of the country which presently is heavily dependent on agriculture. Local demand for cement is met through imports from Kenya.

Earlier in 1967, at the request of the Government of Mauritius, a UNIDO Expert conducted a pre-investment study, recommending the Port Louis area for the siting of a cement project. This idea was, however, rejected in view of the environmental problems the plant would pose in the area.

In view of the priority accorded the industry by the Government, another request was made to UNIDO to conduct a pre-investment study aimed at establishing a Cement Plant at Mahebourg - a location considered more suitable in terms of environmental and social conditions. This area is also rich in coral sand deposits which are expected to be the major inputs for the industry. A draft project document for the establishment of the cement facility, submitted to the Mauritian authorities in April, 1983, need to be revised in the light of the change in location and the environmental problems and up-dated.

B. COMPETITORS

Competitors from outside the Sub-region are mostly cement producers from the developed countries like France, U.S.A., Britain, West Germany and Japan. Transportation cost is however a critical factor that may mitigate against such outside competitors. It is estimated that the local product from the factory will be 30% cheaper than imported cement.

Competitors within the Sub-region include countries like Kenya, Mozambique and Ethiopia which already have existing plants. These plants are, however, incapable of satisfying the cement demand in the sub-region in view of the tremendous expansion in sectors using cement for construction, and the fact that the production of most plants in the sub-region are operating far below capacity for a number of reasons.

C. INFORMATION ON THE PROJECT

1. Technical Aspects:

1.1. Status of Project: It is a new enterprise.

1.2. Products to be manufactured: Portland Cement.

1.3. Main Input Materials: Coral Sand (80%),
silica sand and gypsum (50%) and
Trachyte tuff (10%).

1.4. Market (Export and Local, etc.):
Products are mainly for local consumption.
The rest, if any, will be exported to neighbouring countries and islands.

1.4.2. Demand

Demand is expected to follow the pattern of imports since the country presently meets all its requirements through imports. Table I below gives the imports for cement between 1971 and 1979 (in '000 tons):

TABLE I - CEMENT IMPORTS BETWEEN 1971 AND 1979 ('000 tons)

PRODUCT	1971	1975	1979
Cement	82	117	291

Source: Mauritius - Two-year Plan for Economic and Social Development, 1980 - 1982.

1.5. Plant Capacity and Manufacturing Process:

Plant Capacity: The proposed plant capacity is estimated at 300,000 tons annually.

Manufacturing Process: No choice has yet been made between the two main methods of refining - the dry and the wet processes - but the manufacturing process will entail crushing, grinding, benefication, buring and finish grinding and take into account the utilisation of coral sands in place of limestone.

1.6. Annual Production:

This is estimated at 300,000 tons of cement.

1.6.1. Pricing Policy: Not yet established. However, a competitive price will have to be set taking into consideration the cost of production and the prevailing price of imported cement.

1.7. Availability and Cost of Inputs:

About 75 - 80% of the required input is available in the country. The main input - coral sand - is in abundance but other inputs such as coal, gypsum and silica sand will be imported. This is expected to increase operating costs.

1.8. Plant Location and Availability of Infrastructural Facilities:

The Mahebourg area is the proposed site for the project. The area is considered suitable as the prevailing wind will tend to blow away the polluted air into the sea thereby reducing envisaged environmental problem. Physical infrastructure of the area will be developed in response to the needs of the new project. The siting of the project will help to create a new industrial and employment zone away from the capital city, Port Louis.

2. Financial Aspects:

2.1. Total Investment Costs:

Total project cost is estimated at US$43.1 million including fixed investment, working capital and contingencies. No information is available on the components of this cost. Authorities, however, confirmed that this will depend on the feasibility and other studies to be undertaken by UNIDO.

2.2. Project Financing:

Arrangements for project financing will depend on studies still to be carried out.

2.3. Information on Profitability and Return on Investment:

This will also depend on studies still to be carried out. Earlier studies carried out in 1973 had confirmed the viability of the project under a different location.

3. Foreign Contribution Desired:

The Government of Mauritius will welcome participation by countries within and outside the PTA sub-region in the project in terms of financing equity, loans, licencing and know-how.

4. Project Study Available:

A feasibility study undertaken by UNIDO in 1973 and considered out of place is available.

D. REMARKS:

Presently, there is no cement industry in Mauritius although the annual consumption is over 250,000 tons of imported cement. This high consumption figure is capable of sustaining a cement industry in the country. The utilization of abundant coral sand for the manufacture of cement is considered economically viable since such material is in use in Fiji and a few other countries. The cement industry is considered vital to the overall economic development of Mauritius as it is expected to save substantial foreign exchange for the country, create additional jobs and boost the building and construction industry in particular.

ANNEX C.1.

INDUSTRIAL INVESTMENT PROJECT PROFILE

Project Title: INTEGRATED IRON AND STEEL PLANT

Country: U G A N D A.

A. BACKGROUND INFORMATION

Uganda is endowed with natural iron ore resources which require reduction in order to serve as a source of input such as sponge iron/pellet iron for iron and steel making. At present iron ore deposits exist in the country in the following locations: Haematite deposits at South Kigezi; Magnetite deposits in Tororo; Haematite deposits in North Ankole; Haematite deposits around Jinja and Pyrite dump from Kilembe.

The Haematite deposits in Kigezi which is estimated at 30 million tons is the richest in iron content having an average of 68% Fe. Feasibility studies have confirmed its viability for exploitation but this has been hampered by lack of infrastructure in the area and finance.

Several studies have been conducted on the feasibility of establishing Iron and Steel plants in Uganda. In 1968, the Japan Consulting Institute carried out a feasibility study on the Tororo deposits and recommended the establishment of a factory to process iron and steel into sheet and plate; shape bars up to 65,000 tpy and semi-finished (ingots) 37,640 tpy with the Jinja plant concentrating only on steel re-rolling. Earlier, between 1965 and 1966, the Inter-Consulting Limited of Zurich studied the possibility of exploiting the Tororo magnetite iron ore. The project was given the go-ahead in May, 1970. The Atkins and Partners of

London's report of 1973 recommended that studies be carried out to establish quantities of the Haematite Iron Ore deposits in Kigezi which had high iron (Fe) content and low impurities.

The firm of Manderstam & Partners of London was appointed in 1975 by UNIDO also recommended in 1976 that a detailed survey of the Kashenyi iron ore deposits to establish quantity, quality and possible mining methods as well as extraction costs. Shortly after, the Khohaszati Gyarepit Vallat (KGYV) of Hungary conducted some drilling of deposits. 30 tons of the ore were analysed in Hungary and the conclusion was that charcoal would be suitable as a reduntant. The Ugandan Liberation war in 1978 made it impossible to begin exploitation of the Kigezi Iron ore.

In 1982, a UNIDO Consultant, Mr. Iliev recommended 3 phases in the development of iron and steel industry in Uganda :

(a) 1985-1990 - Facilitation, collection of scrap and increase of capacity of the Jinja Steel Plant from 30,000 tpy to 50,000 tpy;

(b) 1990-1995: Establishment of iron ore processing plant for Kashenyi iron ore to increase raw materials for the Jinja Steel Rolling plant to produce up to 100,000 tpy;

(c) 1995-2000 - Establishment of an integrated Iron and Steel Plant to produce 200,000 tpy of finished products.

B. COMPETITORS

Competitors Outside the Region

The greater part of the world's supply of Iron and Steel products come from the industrialised countries. Currently, the producers of steel in these advanced countries are facing crises emanating from excess capacity and high costs. World market prices are therefore relatively low. Instances of dumping are said to exist.

The United States of America, West Germany, Britain and Japan are major producers of iron and steel products.

Competitors Inside the Region

Apart from Zimbabwe (with ZISCOSTEEL Plant), no other major iron and steel plant exists in the region. However, estimates put the limit of Zisco's capacity at 1.3 million tons. The present capacity is 800,000 p.t.y. In addition, the raw materials in Zimbabwe is not as excellent as the one found in Uganda.

C. INFORMATION ABOUT THE PROJECT

1. Technical Aspects

1.1. Status of the Project: It is a new enterprise distinct from the existing Steel Rolling Plant at Jinja.

1.2. Products to be manufactured : Pig iron, crude steel (primary ingots), sponge iron, steel billets.

1.3. Main Input Materials :

Iron ore, coal coke, scrap metal, converted iron.

1.4. Market (Export, Local, etc.)

1.4.1. Export and Local

- Africa, particularly Southern and Eastern Africa (major consumers: Kenya, Tanzania, Zambia, Ethiopia, etc.).

1.4.2. Eastern and Southern African Market

The Eastern and Southern African States constitute a natural marketing zone for the Ugandan iron and steel in view of their

(a) geographic proximity;
(b) communication facilities; and
(c) expressed desire for mutual economic and trade collaboration.

This region is a substantial consumer of steel products and as table below shows, about 428,000 tons of steel was consumed in the region in 1977.

CONSUMPTION OF STEEL IN SELECTED PTA COUNTRIES IN 1977 ('000 TONS)

COUNTRY	1970	1971	1972	1973	1974	1975	1976	1977
Ethiopia	78	54	37	57	45	30	32	50
Kenya	186	215	181	208	218	122	217	210
Malawi	10	11	12	21	13	15	18	22
Uganda	30	49	12	5	7	6	3	10
Tanzania	82	80	77	92	14	72	101	86
Zambia	59	164	114	128	230	68	43	50
Mauritius	18	15	21	26	39	27	24	N/A
Somalia	5	7	9	8	19	8	9	N/A
TOTAL	468	595	463	545	685	348	447	428

...../5

1.4.3. Demand: As in the case of consumption figures, the demand for iron and steel products show that some countries are major consumers than others within the region. Table below shows the projected demand for steel in 1985, 1990 and 2000 :

'000 tonnes

COUNTRY	1985	1990	2000
Angola	117	192	470
Ethiopia	129	226	855
Kenya	614	1,035	2,356
Madagascar	90	143	306
Malawi	66	120	355
Mauritius	76	118	305
Mozambique	60	119	458
Somalia	26	46	149
Tanzania	250	440	1,107
Uganda	31	83	262
Zambia	233	519	1,205
T O T A L	1,701	3,041	7,828

Source: ECA.

1.4.4. Likely Future Growth in Demand: Demand for iron and steel products within the region is expected to be on the increase on account of envisaged national programmes that would use iron and steel products. In Kenya, there are 6 existing steel rolling mills and the seventh is under construction at Eldoret. These mills are expected to be

major users of steel ingots and billets from the Ugandan plant.

In Zambia, plans are under way for the establishment of a bar and light section mill as well as an irrigation equipment production project. Both projects are expected to increase substantially the steel requirements of the country.

C. GENERAL REMARKS

Necessary data were not available to complete other technical and financial aspects of the profile. It is strongly recommended that PTA fully support the promotion of the project.

The impact of such a project on agriculture and other sectors of the economy will be tremendous. There is need to have a second major Iron and Steel Project in the sub-region to supplement and/or complement Ziscosteel of Zimbabwe. A more detailed review indicating the economic, financial and technical implications of this project need to be carried out.

ANNEX C.2.

INDUSTRIAL INVESTMENT PROJECT PROFILE

Project Title: NEW STEEL ROLLING MILL

Country: Z A M B I A.

A. BACKGROUND INFORMATION

In line with its overall strategy for economic growth and development, the Government of Zambia viewed the establishment of a viable steel industry in the country as a major step towards rapid industrialisation. Consequently, the officials of the Zambian Government, in 1979, requested TATAS of India to assess the feasbility of establishing a steel industry in Zambia. Accordingly, a preliminary report was submitted in March, 1980 and, on the request of the President, a detailed project review was submitted to the Government in June, 1980.

In 1982, the Zambian Government commissioned the Japan Consulting Institute to undertake a pre-feasibility study for the establishment of an Iron and Steel Industry in Zambia. The Japan Consulting Institute in its report submitted in February, 1983, recommended the establishment of an Iron and Steel Industry in two stages - the first stage consisting of steel rolling mill followed by the second stage of direct reduction and steel making.

Between April and May, 1984, another team of experts from TATA Steel conducted preliminary surveys into the establishment of a Steel Re-rolling mill in the country. The proposed plant capacity, estimated at 60,000 metric tonnes per year with a total estimated cost of over US$20 million, is to be sited at the Zambia Steel Building Supplies yard in Lusaka.

The Steel Rolling Mill project is considered as a first stage towards the establishment of a full-fledged Iron and Steel Plant.

B. COMPETITORS

Competitors Outside the PTA Region are mostly steel producers from the industrialised countries such as the United States of America, Britain, Japan and West Germany. At present these producers are experiencing difficulties caused by high operating costs and excess capacity.

Competitors Within the Sub-Region may come from Ziscosteel in Zimbabwe as well as the Ugandan Rolling Mill at Jinja. However, the projected demand for steel products in the sub-region cannot be met by the existing plants.

C. INFORMATION ON THE PROJECT

1. Technical Aspects

1.1. Status of Project: It is a new enterprise.

1.2. Products to be manufactured:

Wire rods, bars, flats, angles and channel sections.

1.3. Main Input Materials:

Steel Billets, rolling tackles, welding materials, fuel oil, lubricant and greases. Most of which are available within the sub-region.

1.4. Market (Export, Local) :

1.4.1. Export and Local :

- Africa, especially the Eastern and Southern African countries, (particularly, Tanzania, Mauritius, Kenya, Malawi and Zaire).
- Locally, steel products from the rolling mill will have a ready market in the building and construction industry and the durable household goods manufacturers.

1.4.2. Eastern and Southern African Market

The countries in the PTA region constitute a ready market for the products of the Zambian Rolling Mill because of their proximity and their desire for trade and economic co-operation.

The sub-region as a whole is a substantial consumer of steel products. For the year 1985, the consumption of steel products in the sub-region is estimated at 1,701,000 tons.

1.4.3. Demand

Zambia's demand for steel products is estimated at 110,000 metric tons per annum in 1984 and is expected to increase to 195,000 by the year 2000. The engineering industry is expected to be a major consumer of steel products especially those from the Steel Rolling Mills. The estimated future demand for steel products in the engineering industry in the PTA region for 1985, 1990 and 2000 (7000 tons) is shown below in Table II.

TABLE II - ESTIMATED DEMAND FOR STEEL PRODUCTS IN THE ENGINEERING INDUSTRY IN THE PTA SUB-REGION

TYPE OF STEEL PRODUCT	1985	1990	2000
Miscellaneous steel Semis (rounds, wire)	30	57	160
Hot or Cold Rolled Bar	66	125	348
Hot or Cold Rolled Strips	8	15	42
Steel Plates	60	114	319
Rolled or Drawn Sheets	15	28	79
Steel Tubes	15	29	82
Pig Iron	93	178	495
Forged Pieces	24	46	127
Cast Steel	25	48	133
Miscellaneous Pieces	7	13	36
T O T A L	343	653	1,820

Source: E.C.A.

1.5. Plant Capacity and Manufacturing Process

1.5.1. Plant Capacity: A plant capacity of 60,000 metric tons of steel products per year is estimated. This estimate is based on 3 shifts covering 15,000 metric tons of wire and 45,000 metric tonnes of bar and sections.

1.5.2. Manufacturing Process:

The manufacturing process involves reheating of steel billets, hot rolling into bars and sections, drawing into wire rods and finishing.

The technology proposed will entail hot rolling products from the billet stage up to the rolling temperature using heavy furnace oil. The milling process will consist of the following rolling sections :

Reversing Mill	-	for rough passes
Cross Country	-	for intermediate passes
Looping Mill	-	for finishing stages for Bars and sections
Continuous Mill	-	finishing wire rods.

At the Reheating Stage, the mill will have material handling facilities for feeding a closed chamber oil fired furnace with a discharge capacity of 20MT per hour; equipped with heat recovery facility.

The balancing facility in the rolling section would comprise of tilting tables, drop guides, mechanised repeaters and walking beam type cooling bed.

1.6. Annual Production

1.6.1. Product Mix:

ROLLED PRODUCT	DIMENSION RANGE	STEEL GRADE	ANNUAL PRODUCTION
Wire Rods	6.8 and 10 MM diameter	High Carbon and low Carbon Steel	15,000 MT
Plain Rounds	10 to 25 MM diameter	Mild Steel	14,000 MT
Reinforcing	10 to 25 MM diameter	Low Carbon Alloyed Steel	15,000 MT
Square Bars	10 to 25 MM diameter	Mild Steel	1,000 MT
Flats	25 x 5 MM to 100 x 12 MM diameter	Mild Steel	3,000 MT
Angles	40 x 40 MM to 75 x 75 MM diameter	Mild Steel	9,000 MT
Channels	100 x 50 MM and 76 x 38 MM diameter	Mild Steel	3,000 MT
		T O T A L	60,000 MT

1.6.2. Pricing Policy

The export price (FOB) of the products has been assumed to be K.1,550 per metric tonne in 1984 (about US$674). Variation in prices will depend on cost of inputs and prevailing prices of similar imported goods.

1.7. Availability of Manpower, Raw Materials and Utilities (Power, Water, etc) :

1.7.1. Availability of Inputs

As at present, steel billets have to be imported primarily from Zimbabwe by railway transport.

1.7.2. Utilities

Adequate power and water supply is available locally. Cost of utilities is estimated at US$130,000 per annum.

1.7.3. Manpower

Substantial provision has been made for intensive training of basically qualified personnel to be recruited. Priority will be given to the effective transfer of technology and continuous training of technical and managerial staff. 370 employees are proposed at an estimated cost of US$1,612,000 per annum.

Cost of Inputs

The non-availibility of such inputs as billets, lubricants, greases and spares as well as certain skilled manpower in the country may add substantially to the total operating costs. Total raw materials and other inputs are estimated at US$8,578,000.

1.8. Plant Location and Availability of Infrastructural Facilities :

The plant is to be located in the Zambian Steel and Building Supplies yard along Mungwi Road in Lusaka. The total land area is 6 hectares and is adequately served by good road and rail networks.

.2. FINANCIAL ASPECTS

2.1. Total Investment Costs

Total project cost, broken into Land, Construction, installed equipment and Working Capital indicating foreign exchange component :

	Local Currency Component (US$ million)	Foreign Currency Component (US$ million)	Total (US$ million)
A. Fixed Investment			
L a n d	-	-	-
Civil/Structural Work	1.27	1.53	2.80
Charges Payable for power, water and borehole	0.35	-	0.35
Plant and Machinery	0.70	11.79	12.49.
B. Pre-Production Capital Expenditures			
Preliminary Expenditure (including construction facilities)	0.14	-	0.14
Pre-financing and Commitment Charges	2.33	-	2.33
Supervision/ Administrative Charges	-	0.66	0.66
Start-Up/Training Expenses	0.15	0.15	0.30
Provision for Contingencies	0.22	1.13	1.35
C. Working Capital	1.07	1.07	2.14
T O T A L	6.23	16.33	22.56

N.B.

The above project cost estimates are based on budgetary estimates of June, 1984 cost index levels. It is quite likely that the final costs with inflation index of 10% per annum would be about 25% in excess of estimates of mid-1984 cost levels.

2.2. Total Sales Revenue

Based on work at two-thirds capacity the anticipated Sales Revenue is US$26,960,000 per annum.

2.3. Project Financing

The proposed financial structure indicating expected sources and terms of equity and Loans.

The operating company's Capital Structure is assumed to be based on a 2:1 Debt Equity Ratio. Long-term foreign loans are assumed to carry an interest rate of 10% per annum. Medium-term loans carry an annual interest rate of 11% per annum while Short-term loans and overdrafts for working capital carry an interest of 10% per annum. The after tax cost of capital is expected to be between 7 - 8% per annum.

	Local Sources (US$ million)	Foreign Sources (US$ million)	Total (US$ million)
Equity	4.51	3.01	7.52
Long-Term Loans	3.01	9.52	12.53
Short-Term Loans/ Overdrafts	2.51	-	2.51
T O T A L	10.03	12.53	22.56

2.4. Information on Profitability and Return on Investment:

Assuming a 'net book' f.o.b. value of K.1,550 per tonne i.e. about US$674.

- Internal Rate of Return is 15%.
- Pay-back period is about 6 years.

3. FOREIGN CONTRIBUTIONS DESIRED

The Government of Zambia will :

(a) appreciate equity participation of PTA member-States and a joint-venture technical partner also with equity participation from outside the sub-region.

(b) appreciate a long-term loan.

Technical Training and a Management and Technical Agreement Contract are considered essential especially during the first few years.

4. PROJECT STUDY AVAILABLE

Feasibility Studies on the project are available.

REMARKS

In view of the promising demand projections and backward and forward linkages which the project is expected to create for the region, implementation of the project is accorded high priority.

The project is expected to provide materials for infrastructures, and the building/construction and engineering industries. It will also provide essential inputs for the proposed Irrigation Equipment Projects and foster the establishment and growth of a wide range of industries. Equally important, it is expected to save foreign exchange especially in the long run.

From a sub-regional point of view, it is expected that this project will complement Ziscosteel's plant in Zimbabwe by relying on the latter for billets and other inputs, and for certain types of training and transfer of technology.

ANNEX D.1.

INDUSTRIAL INVESTMENT PROJECT PROFILE

Project Title: MANUFACTURE OF POTASH FERTILIZER

Country: ETHIOPIA.

A. BACKGROUND INFORMATION

The Ethiopian potash deposits are located in the Dallol area of the Danakil Depression, a closed-drainage basin which trends almost parallel to the Red Sea and is about 50 - 90 km inland within Ethiopia.

The deposits were first discovered in 1911. An Italian company, Compagnia Mineralia Coloniale, was given mining rights in 1916 and was said to have produced up to 70,000 tonnes in 1929. The company later stopped its operations and the concession was abandoned.

In 1958, an American firm, Ralph M. Parsons, was granted a concession in the area. Parsons began exploration work in 1959. It went as far as sinking a shaft and undertaking floatation and crystallization studies with a view to undertaking exploitation of the ore. It also made a survey of transport, harbour and other infrastructural facilities needed for the purpose. However, in March, 1967, the potash mine was accidentally flooded and mining operations ceased. Although Parsons commissioned a detailed study for the control of ground water problem, it withdrew from the project in April, 1968 and surrendered the concession.

In the second half of 1971, the Ethiopian Government invited the United Development Co. of Israel to make a fresh technical and economic evaluation of the project. The company submitted a techno-economic report

which made estimates of capital investment required for developing and marketing the potash. Since these estimates were outdated, a firm of Consultants, the Fertilizer (Planning and Development) India Limited, made an attempt to up-date them in 1981.

Exploration work until now has revealed two ore bodies. The first, The Crescent Ore Body, has a total reserve of 12 million tonnes of which 3 million tonnes of reserve (KCl) are recoverable. The other, the Musley Ore Body, has a total reserve, in the form of sylvite, of about 160 million tonnes. 66 million tonnes of this reserve are in the "proven" category. The production proposal envisages a plant capacity of about 1.5 million tonnes of potassium chloride (muriate of potash) per annum.

B. COMPETITORS

As of 1976, the total potash reserves that can be mined at the prevailing mine-head prices were estimated at 13 billion tonnes in terms of potassium oxide (K_2O). However, the known total reserves which could be recovered with existing technology, assuming appropriate market prices, are estimated at over 140 billion tonnes.

Competitors Outside the Region

The world supply capacity for potassic fertilizers, especially the muriate of potash, is highly concentrated. In 1980, six countries, namely, U.S.S.R., Canada, East Germany, West Germany, U.S.A. and France accounted for over 90% of potash capacity, with USSR and Canada together accounting for 58% of world capacity, in terms of potassium oxide (K_2O).

COUNTRY	RECOVERABLE RESERVE (Million Tonnes of K_2O)
Canada	9,000
U.S.S.R.	2,000
Germany - GDR	900
Germany - FDR	500
U.S.A.	180
France	90

Competitors Inside the Region

Apart from the Ethiopian deposit, the other known deposit in Africa is found to occur in Congo. The total reserves, including potash that could be recovered with existing technology at future date and assuring acceptable market prices are put at 200 million tonnes. However, the reserves are not currently being exploited. There is therefore no production of potash now in Africa.

C. INFORMATION ON THE PROJECT

1. TECHNICAL ASPECTS

1.1. Status of Project: It is a new enterprise.

1.2. Product(s) to be Manufactured:

Muriate of Potash (potassium chloride) KCl - of high potash content (60% of K_2O).

1.3. Main Input Materials:

Sylvite Ore.

1.4. Market (Export, Local, etc.):

1.4.1. Export and Local :

- Africa, particularly Eastern and Southern Africa (major consumers being Ethiopia, Kenya, Tanzania, Zambia, Zimbabwe and Mauritius).
- Asia/Oceania Region (major consumers being Japan, India, South Korea, Malaysia, Indonesia, China, Australia and New Zealand).

Consumption and expected demand in both regions are as follows :

REGION	UNIT	CURRENT ANNUAL CONSUMPTION (1981)	PROJECTED CONSUMPTION IN 1990	IN 2000
Eastern & Southern Africa.	'000 t	52	133	232
Asia/ Oceania	'000 t	2,600	5,200	9,700

Assuming that Ethiopia's share of the K_2O demand in Eastern and Southern African states will be 70% in 1990 and 80% in 2000, the quantities that can be exported to this region will be

90,000 tonnes in 1990 and 184,000 in 2000.

In the Asia/Oceania region, it is reasonably expected that Ethiopia can have a share in K_2O market up to 1.3 million tonnes (25%) by 1990 and about 5.6 million tonnes (35%) by 2000; in terms of muriate of potash, 2.2 million and 9.3 million tonnes respectively.

1.4.2. Eastern and Southern African Market

The Eastern and Southern African states constitute a natural marketing area for Ethiopian potash on account of their

(1) geographic proximity;

(2) expressed desire for mutal economic and trade co-operation.

This region is not a major consumer of potash. The major consumers which are included for study are Ethiopia, Kenya, Zambia, Zimbabwe and Mauritius. They together accounted for about 23% of the potash consumption in Africa, excluding South Africa.

Imports: All the countries depend on imports at present to meet their total requirement of potash.

The table below shows the quantity of potash by each of the countries from 1970 to 1980 :

'000 tonnes

COUNTRY	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Zimbabwe	N/A	N/A	30	32	30	30	35	24	23	28	-
Mauritius	9	10	4	12	19	7	12	14	14	9	13
Zambia	6	8	9	6	6	5	6	6	3	3	-
Ethiopia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	.06	4
Tanzania	N/A	N/A	N/A	N/A	N/A	N/A	2	2	5	7	-
Kenya	8	5	6	3	6	5	7	8	5	7	-
TOTAL	23	23	49	53	61	47	62	54	50	54	17

Source: (1) British Sulphur Corporation (2) Potash Statistics 1980 SMA.

Demand: As in the case of imports, demand for potash in these countries has also not shown any definite trend. Table below shows consumption of potash in the region :

'000 tonnes

COUNTRY	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Zimbabwe	25	28	31	32	35	35	33	23	23	23	23
Tanzania	2	3	3	3	5	4	1	4	4	4	-
Kenya	12	13	14	5	7	4	7	5	8	7	5
Zambia	6	8	9	6	6	2	5	6	3	3	-
Mauritius	10	10	9	12	15	10	14	16	13	13	13
Ethiopia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL	55	62	66	58	68	55	60	54	51	50	41

Source: British Sulphur Corporation.

Likely Future Growth in Consumption: Only in Zimbabwe, Tanzania and Kenya is some growth expected in the consumption of potash in the near future.

In Mauritius, almost the entire land is under cultivation and the use of potash is more or less optimal at the recommended level. There appears, therefore, to be no scope for any increase in the use of potash as a fertilizer. In Zambia and Ethiopia, the need for the use of potash on different crops is not indicated and it is unlikely that there will be large scale increase in the use of this fertilizer in the years ahead. Modest increase may take place due to possible intensity of cropping and changes in cropping pattern.

In Zimbabwe, agriculture is relatively more advanced in the modern sector. Potash is being used on crops like Tobacco, Tea, Coffee, Maize, Orchards, Alfaalfa, and Potato. It is assumed that demand for potash may grow at the rate of about 5% per annum up to 2000 AD.

In Tanzania, rate of growth is expected to be 13% till 1990 and 9% up to 2000. Tobacco, Maize, Tea and Coconut are the major crops for which potash is used.

In Kenya, there are schemes to revive the fallen demand of potash. Such schemes include increase in fertilized area under maize, small holder coffee improvement programme in collaboration with the World Bank, Lower Tana Village Irrigation Scheme and South Kenya Rice Scheme. These may increase the demand for K_2O by about 8 to 9 per cent per annum up to the year 2000.

Table below shows likely future demand for potash :

'000 tonnes

COUNTRY	1980	1985	1990	1995	2000
Zimbabwe	40	51	66	82	104
Tanzania	6	8	15	24	36
Kenya	8	12	18	28	41
Zambia	3	5	9	14	22
Mauritius	13	14	16	17	18
Ethiopia	-	-	5	6	10
TOTAL	70	90	129	171	231

Source: The Fertilizer (P&D) India Ltd.

1.5. Plant Capacity and Manufacturing Process :

Plant Capacity: A production capacity of 1.5 million tonnes of potassium chloride per annum is estimated.

Manufacturing Process: Underground mining of sylvite ore and refining (plant processing) of the ore to produce potassium chloride.

1.6. Annual Production:

1.6.1. An operation period of 12 years is planned. Plant will start production in Year 4, that is, three years after implementation. The production programme envisages that plant will operate at a capacity of 66.67% in Year 4 and reach a capacity of 75% and 100% by Year 5 and Year 6 (and subsequent years) respectively.

YEAR	QUANTITY ('000 tonnes)	UNIT PRICE FOB (US$)	ANNUAL TURNOVER ('000 US$)
4	750	100	75,000
5	1,125	"	112,500
6	1,500	"	150,000
'	'	'	'
'	'	'	'
'	'	'	'
'	'	'	'
15	1,500	"	150,000

1.6.2. Pricing Policy:

The export price (FOB) of potassium chloride has been assumed as US$100 per tonne.

1.7. Availability and Cost of Manpower, Raw Materials and Utilities (Power, Water, etc.) :

Availability of Inputs: Over 66 million tonnes of proved reserve of sylvite are available. Skilled labour, water and power supply are, however, lacking.

Cost of Inputs: Owing to lack of skilled labour, personnel must be brought in and housing facilities built. Since there is no power supply in the proposed area, provision of power generation facilities has been included in the capital cost of the project.

At full capacity, management and other overhead costs are estimated at US$1.41 million. An annual cost of production is calculated to be US$76.9 million.

1.8. Plant Location and Availability of Infrastructural Facilities :

It is proposed to locate the plant in Dallol, about 90 km by road from Mersa Fatma on the Red Sea coast. Dallol lacks infrastructural facilities such as rail, road and harbour connecting it with the Red Sea.

2. FINANCIAL ASPECTS

2.1. Total Investment Costs:

Total project cost, broken down into land, construction, installed equipment and working capital, indicating foreign exchange component :

	Local Currency Component (US$ million)	Foreign Currency Component (US$ million)	Total (US$ million)
A. FIXED INVESTMENT			
Land, Site Development	--	--	--
Buildings and Civil Works	72.12	59.00	131.12
Power Pland and Electrical Distribution	27.95	--	27.95
Machinery & Equipment	--	108.07	108.07
Transport	2.66	--	2.66
B. PRE-PRODUCTION CAPITAL EXPENDITURES			
Pre-operational Expenses	0.18	3.49	3.67
Interest During Construction	16.83	--	16.83
C. WORKING CAPITAL (Company Margin - at 33.33% of Total)	9.70	--	9.70
T O T A L	129.44	170.56	300.00

2.2. Project Financing:

Proposed financial structure, indicating expected sources and terms of equity and loans:

The operating company's capital structure is assumed to be based on a debt: Equity ratio or 2:1.

Long-term loans are assumed to carry an interest rate of 12% per annum.

The margin on working capital is assumed to be 33.33% which is capitalised. The balance is assumed to be covered by commercial bank loans at 15% interest.

	Local Sources (US$ million)	Foreign Sources (US$ million)	Total (US$ million)
Equity	60.00	40.00	100.00
Long-term loans	38.45	121.75	160.20
Short-term loans, Overdraft	39.80	--	39.80
T O T A L	138.25	161.75	300.00

2.3. Information on Profitability and Return on Investment :

Assuming a "net buck" F.O.B. value of US$100 per tonne of potassium chloride

- Internal Rate of Return (IRR) of project is 16-87%;
- Pay-back period works out to 4.88 years; and
- Break-even capacity is around 48%.

3. Foreign Contribution Desired:

Equity participation and loans will be required. The Ethiopian Government has invited other member-States of the PTA to participate in the project. A technical partner with necessary know-how and technology is essential. Management, training and technical assistance will form part of the joint-venture agreement.

4. Project Study Available:

A feasibility study is available.

D. GENERAL REMARKS

The project deserves particular priority in the sub-region. It will utilise local deposits of potash. The local production of potash fertilizer will contribute to improved agriculture, thereby increasing food production and reducing food imports.

ANNEX D.2.

INDUSTRIAL INVESTMENT PROJECT PROFILE

Project Title: MANUFACTURE OF PHOSPHATE FERTILIZER

Country: U G A N D A.

A. BACKGROUND INFORMATION

Phosphate rock is the essential raw material for the manufacture of phosphate fertilizers. It occurs in either igneous or sedimentary deposits in many parts of the world.

Phosphate deposits have long been known to exist in the eastern part of Uganda. The most prominent is the Sekulu Hills deposit encompassing the southern-most portion of a belt of ten apatite-bearing deposits of residual soil stretching from north to south for about 250 kilometers.

The Sekulu Hills phosphate deposit was first discovered in 1939. During the early 1960s, the Government of Uganda established Tororo Industrial Chemicals and Fertilizers (TICAF) to develop the deposit for the manufacture of Single Superphosphate (SSP) for domestic consumption and for export to Kenya and Tanzania. The production capacity of the plant was about 6,000 tonnes per year of bagged, granular SSP. Operations began in 1964 and were carried out successfully for about ten years until they began deteriorating due to the lack of spare parts and general constraints on the economy at that time. The plant was closed down in 1978. The existing facility is severely damaged by extensive corrosion and is essentially inoperable.

Under its programme of economic recovery, the Government of Uganda wishes to pursue the development of the phosphate reserves to meet the

phosphate fertilizer needs in the Eastern and Southern African sub-region. Consequently, on March 25, 1982, TICAF commissioned Bearden-Potter Corporation (BPC) of the United States to carry out a detailed engineering study to determine the most viable phosphate fertilizer project based on the exploitation of the Sekulu Hills phosphate deposit.

Studies carried out by earlier workers and Bearden-Potter show that the Sekulu Hills deposit contains an estimated reserve of 230 million tonnes of residual soil with an average grad of 12.8% P_2O_5. The recoverable phosphate from this ore is estimated to be 20 to 25 million tonnes at an achievable grade of 40% P_2O_5.

The proposed project is to renew the phosphate industry by building a facility to mine the reserves in the South Valley of the Sekulu Hills and to beneficiate the ore to produce a rock concentrate. This concentrate will be converted into single superphosphate in a facility to be built at the location of the previous TICAF plant. In addition to the manufacture and sale of SSP, the plant will be capable of combining SSP with calcium ammonium nitrate (CAN) to produce a low analysis ammoniated phosphate, 4-18-0 for direct sale. The envisaged plant capacity is 50,000 tonnes per year of SSP.

B. INFORMATION ON THE PROJECT

1. Technical Aspects

1.1. Status of Project: Renewal and Expansion

1.2. Product(s) to be manufactured :

- Single Superphosphate (23.7% P_2O_5), as the primary product;
- Low analysis ammoniated phosphate (4-18-0).

1.3. Major Input Materials:

Phosphate rock, sulphur, calcium ammonium nitrate (CAN).

Sulphur and CAN have to be imported.

1.4. Market (Export, Local, etc):

Export and Local.

1.4.1. Competition

TICAF faces outside competition, arising from imports and AID fertilizers. Table 1.4.1. presents the past and projected world production capacity for wet-process phosphoric acid - the dominant phosphate intermediate which is used today to produce finished high analysis phosphates. The world trend is toward an increasing share of phosphates coming through the wet process method; approximately 75-80% of all phosphatic fertilizers are produced by this method.

TABLE 1.4.1. - PAST AND PROJECTED WORLD PRODUCTION CAPACITY
MILLION TONNES

	1975	1978	1980	1982	1985	1987	1990
Africa	1.1	2.4	2.5	3.6	4.2	5.2	5.7
Asia (Plus China)	2.1	2.9	2.9	3.3	3.9	4.4	4.7
Europe East (Plus USSR)	3.9	5.6	7.9	9.2	10.0	10.2	10.5
West	4.2	4.5	4 6	4.4	4.3	4.0	3.7
North America	7.9	9.7	10.2	10.8	11.6	12.0	12.3
Latin America	0.8	0.9	1.0	1.6	2.0	2.2	2.2
Oceania	0.2	0.2	0.2	0.3	0.3	0.3	0.3
TOTAL	20.2	26.2	29.6	33.2	36.3	38.3	39.4

World capacity is estimated to expand at about 1.5% per year during the period 1985-1990, as compared with 8% per year rate which has recently taken place. This may be attributed to the current depressed demand of phosphate fertilizer and the resultant depressed prices.

1.4.2. World Demand:

Table 1.4.2. presents past and projected phosphate fertilizer demand. Demand increased from 24.9 million tonnes in 1975 to 31.1 million tonnes in 1980 and then decreased to 28.9 million tonnes in 1982, showing an average rate of 2%. Over the next fifteen years

demand is expected to expand from 35 million tonnes in 1985 to about 63 million tonnes in 2000 at an average rate of 4.9% per year.

TABLE 1.4.2. - PAST AND PROJECTED DEMAND OF FERTILIZER

	1975	1980	1982	1985	1987	1990	1995	2000
Africa	.8	1	1.2	1.4	1.6	1.9	2.4	3
Asia (Incl. China	3.6	5.1	6.6	7.8	9	10.8	13.5	16.7
Europe (Incl USSR)*	7.9	9.1	9.4	10.9	12.0	13.9	16.9	20.6
West	4.9	6.6	5.5	5.8	6.1	6.4	6.6	6.7
Latin America	1.6	2.5	2.1	2.7	3.2	4.2	5.6	7.5
North America	5.2	5.5	5.0	5.4	5.6	6	6.5	7
Oceania	0.9	1.3	1.1	1.1	1.2	1.2	1.3	1.3
TOTAL	24.9	31.1	28.9	35.1	38.7	44.3	52.8	62.8

* including other centrally planned nations.

1.4.3. Eastern and Southern Africa

Table 1.4.3. below shows past and projected consumption of phosphate fertilizers (in pure nutrient P_2O_5) in Eastern and Southern Africa.

TABLE 1.4.3. -

tonnes

1964/65	1968/69	1977/78	1984/85	1993/94	2000
40,118	72,985	132,147	538,356	995,342	1.3 Million

Consumption increased from 40,118 in 1964/65 to 132,147 tonnes in 1977/78 at an average growth rate of 16.38%. Consumption is

estimated to increase to 1.3 millions by the year 2000 at average annual growth rate of 38.42% based on past trends and on the basis of assumed increase in cultivated areas.

1.4.4. TICAF'S PRIMARY MARKET:

The primary market areas within the PTA sub-region for TICAF's phophates are Kenya, Tanzania, Ethiopia and Uganda itself. Outside the PTA sub-region, the neighbouring States of Sudan, Rwanda, Burundi and Zaire are potential markets; transportation routes into these countries are readily available.

Table 1.4.4. shows past and estimated consumption of phosphatic fertilizer in the primary market area.

TABLE 1.4.4. - PAST AND PROJECTED CONSUMPTION OF PHOSPHATIC FERTILIZER IN TICAF'S PRIMARY MARKET ('000 TONNES)

COUNTRY	1975	1980	1982	1987	1995	2002	GROWTH RATES 1975-82	GROWTH RATES 1987-2002
Kenya	29	10	40	55	85	112	4.7	6.5
Tanzania	11	5	10	14	20	30	-1.1	7.1
Uganda	2	Nil	1	8	14	28	-6.3	15.6
Ethiopia	11	53	4	6	10	13	-8.0	7.3
T O T A L	53	68	55	83	129	183	0.5	7.5

1.5. Plant Capacity and Manufacturing Process:

Plant Capacity: A production capacity of 50,000 tonnes of single superphosphate (SSP) per year is proposed.

Manufacturing Process: This will involve :

(1) Mining the phosphate ore and processing it to produce phosphate concentrate;

(2) Beneficiating the concentrate by scrubbing magnetic seperation to prepare a feed material for the flotation section;

(3) Cleaning the feed to about 40% P_2O_5 using selected reagents in the flotation section;

(4) Manufacturing sulphuric acid by burning sulphur in a conventional double absorption contact sulphuric acid plant;

(5) treating the resulting concentrate from the flotation chamber with sulphuric acid in a chemical plant to produce single superphosphate (23.7% P_2O_5);

(6) drying, curing and bagging the single superphophate.

To produce the low analysis ammoniated phosphate (4-18-0), a portion of the SSP is combined with calcium ammonium nitrate in the chemical plant.

1.6. ANNUAL PRODUCTION

1.6.1. The project is expected to begin in 1985. Start-up time is scheduled for January, 1989. An operation period of 15 years is planned.

1.6.2. The production programme envisages that the plant will increase from a capacity of 54% (27,000 tonnes) in 1989 to 58% in 1990 and finally to 90% and 100% in 1995 and 1996 respectively.

1.6.3.

	1989	1990	1995
Output ('000 tonnes)	27	29	45
Salles (Million US$)	22.9	32.6	70.7

1.6.4. Pricing Policy

Products are priced at levels which were derived from equivalent nutrient values of internationally traded commodities, namely, Single/Triple Super-Phosphate and urea.

The prices have been developed on a wholesale basis for SSP and 4-18-0.

1.7. Availability and Cost of Manpower Raw Materials and Untilities (Power, Water, etc.) :

Availability of Inputs: Phosphate rock and pyrites are available. Phosphate reserves are estimated at 230 million tons (12.8 P_2O_5). Sulphur (26,000 tonnes); CAN (22,000 tonnes; and bags (4.9 million) will be purchased. Other raw materials are petroleum products, fatty acid, flocculant, caustic, starch, hydrated lime, limestone, alum and diatomaceous earth.

Electricity and water are available. Electricity at approximately 18 million kWh/year will be supplied from the national grid. Water at the rate of 5,650m^3/day will be taken from the Malaba River, 4 km south of the Sekulu Hills.

Manpower is available; most will need training. An ultimate staffing level of 500 is expected.

1.8 Plant Location and Availability of Infrastructural Facilities:

Plant Location is Tororo.

Physical infrastructural facilities are adequate. Location shows the following advantages: Good electricity supply - hydropower is available, design includes turbo-generator; adequate watter supply; good roads; primary water treatment; boiler water treatment; potable water treatment and distribution; sewage

treatment; rail yard; fire water systems; offices and shops; power distribution; and housing for staff.

FINANCIAL ASPECTS

2.1. Total Investment Costs:

Total investment outlay is estimated at 96.2 million US Dollars, including interest during construction and working capital.

		LOCAL CURRENCY ('000 US$)	FOREIGN CURRENCY ('000 US$)	T O T A L ('000 US$)
A.	Equipment and Materials	1,196	17,594	18,790
	Sub-Contracts	5,521	-	5,521
	Demolition	322	-	322
	Freight	-	5,301	5,301
	Construction Costs	3,532	11,854	15,386
	Engineering	-	3,800	3,800
	SUB-TOTAL	10,571	38,549	49,120
B.	Pre-Operating Expenses	3,061	5,228	8,289
	Working Capital	910	2,739	3,649
	SUB-TOTAL	14,542	46,516	61,058
	Contingency	1,163	3,721	4,884
	Inflation	3,539	11,521	15,060
	Escalation	-	803	803
	T O T A L	19,244	62,561	81,805
	Interest During Construction	-	14,388	14,388
	GRAND TOTAL	19,244	76,949	96,193

2.2. Project Financing

The proposed financing plan is suggested below :

(in million US$)

	NON-CASH EQUITY	LOCAL SOURCES	FOREIGN SOURCES	INTEREST DURING CONSTRUCTION	T O T A L
Equity Govt of Uganda.	1.0	13.9	-	-	14.9
Local Investors	-	4.7	-	-	4.7
Institutional Investors	-	0.6	3.1	-	3.7
Foreign Investors	-	-	5.0	-	5.0
Export Credits	-	-	15.8	4.1	19.9
Long-Term Loans	-	-	38.7	10.3	49.0
TOTAL	1.0	19.2	62.6	14.4	97.2

2.2.1. Export credits covering about 90% of the foreign equipment and materials of the project are assumed to be available. An average interest rate of 10% per annum is assumed.

2.2.2. The proposed arrangement gives a debt:equity ratio of 2.4:1.

2.2.3. Non-cash equity represents the salvageable value of the existing buildings.

2.3. Information on Profitability and Return on Investment :

- Internal Rate of Return (IRR) on total capital is 14.8%
- NPV at discount rate of 10% is US$21.767 million.
- Return on Equity is 27.9%.

3. Foreign Contribution Desired:

Equity participation and loans will be required. The Government of Uganda is willing to involve other member-States in the sub-region in technical services and marketing. Management, training and technical assistance will form part of the joint-venture agreement.

4. Project Study Available:

A full feasibility study is available.

C. GENERAL REMARKS

The project is very important to the Government of Uganda in its recovery programme. The project will utilise the large local deposits. Its tremendous linkage effect will ensure the acceleration of capital formation. It will contribute to the improvement of agriculture and save foreign exchange.

Technology is supposed to be 'simple'; Capacity only 50,000 tons. Total investment of over US$97 million appears exorbitant. Costs like Demolition, Freight, Pre-operating expenses, Provisions for Inflation and Interests take over two-thirds of Total Investment. A review of the costing is therefore recommended by the Consultant.

ANNEX D.3.

INDUSTRIAL INVESTMENT PROJECT PROFILE

Project Title: MANUFACTURE OF CAUSTIC SODA

Country: K E N Y A.

A. BACKGROUND INFORMATION

The countries of Eastern and Southern African sub-region rely heavily on imports for their requirements of caustic soda. Their total demand for caustic soda is estimated at 25,000 tonnes per year. Current level of imports into Kenya is put at 12,000 tonnes per year. With the exception of a 5,000 tonnes per year captive plant in Kenya owned by Panafrican Paper Mills, Webuye, there is nc chloralkali plant in the sub-region. In order to (1) substitute the current imports for domestic use so as to save foreign exchange, (2) use locally available raw materials that are currently either inadequately exploited or exported without maximum local value added and (3) exploit expor: market to PTA sub-region and thus earn foreign exchange, various proposals of establishing a caustic soda plant in Kenya have been made.

Caustic soda is produced by using either the causticization (or chemical process)method or the electrolysis method. The chemical

process involves reacting soda ash with slaked lime (calcium hydroxide) to yield caustic soda and calcium carbonate. The electrolysis method requires sodium chloride (common salt) as the major raw material and electricity as a necessary energy input. This process yields caustic soda, chlorine and hydrogen.

Unfortunately, the production of caustic soda by the electrolysis method has the disadvantage of requiring a lot of electrical energy and the production of chlorine in an amount that is in excess of local demand. Electrolysis of brine is bound by the stoichiometry of the process to give 1.1 tonne of caustic soda for every tonne of chlorine. It is therefore very important to survey as well the market for chlorine as inability to market sufficient quantities of it may determine the profitability or otherwise of the operation.

In developing countries, owing to

(1) the negligible demand for chlorine,

(2) the problems of disposal because of slow development of chemical industries,

(3) the difficulties in transportation in terms of safety factors, and

(4) the high cost of electricity,

there is severe limitation for the establishment of a chloralkali plant.

Since the production of caustic soda by the chemical process does not produce chlorine, the process has been considered as a more suitable alternative.

Biashara Investment in 1983 proposed to produce 30,000 tonnes of caustic soda per year by the causticization method at an estimated investment cost of Ksh.177 million (or US$11.06 million).

Another proposal in 1984 by Banco Chemicals Limited planned to manufacture 7,000 tonnes of caustic soda per year using the same process.

This profile is based on a proposal by Lahore Investments Limited of Pakistan (in 1978) to produce, by causticization method, 30,000 tonnes of caustic soda per year. An investment outlay of US$6.58 million was envisaged.

B. COMPETITORS

Competitors Outside the PTA Sub-region:

These are mostly chloralkali industries from the industrialised countries. The major world producers are USA, Japan, West Germany, USSR, UK, France and Italy. The industry is at present facing a severe recession. This has resulted in the international companies dumping their products in the markets of developing countries at very low prices. Consequently, delivered consumer prices in Kenya (after duties, transportation, etc.) are quite low. In the developed countries, emphasis of the chloralkali industry has been more on chlorine and its use in the plastics industry for the manufacture of PVC, etc.

Competitors Within the PTA Sub-region:

In the developing countries much emphasis is laid on caustic soda. The countries of Eastern and Southern Africa have largely relied on imports to meet their demand for caustic soda. None of the countries has a chloralkali plant. The only plant available in Kenya - Panafrican Paper Mills Limited at Webuye - is a captive plant with a capacity of 5,000 tonnes per year.

C. INFORMATION ON THE PROJECT

1. TECHNICAL ASPECTS

1.1. Status of Project:

It is a new enterprise still to be established.

1.2. Product(s) to be manufactured:

Caustic Soda, 98% solid/flake.

1.3. Major input materials:

Soda ash and limestone. Other chemicals required in small quantities include sodium nitrate, sulphur, and hydrochloric acid (for making sodium sulphate).

1.4. Market (Local, Export):

Local and export.

1.4.1. Local Market

The domestic demand for caustic soda can be estimated by looking at the import statistics and domestic production.

Table 1 below shows the import figures between 1977 and 1982.

TABLE 1 - IMPORTS OF CAUSTIC SODA (TONNES)

1977	1978	1979	1980	1981	1982
7,563	6,795	7,136	11,032	15,037	9,220

Taking a 3-year moving average, we have smoothened-out figures as shown in Table 2.

TABLE 2 - IMPORTS OF CAUSTIC SODA: 3-YEAR MOVING AVERAGE (TONNES)

1978	1979	1980	1981
7,165	8,321	11,068	11,763

Imports of caustic soda seem to have increased from an average of 7,165 tonnes per year in 1978 to an average of 11,763 tonnes per year in 1981. This gives an average annual growth rate of 16.0%.

Panafrican Paper Mills Limited at Webuye produces about 5,000 tonnes of caustic soda per year, consuming about 4,500 tonnes and selling the rest in the local market.

Owing to (1) increased production of soap and refined vegetable oil, and (2) the increased supply of treated water, the consumption of caustic soda is expected to have increased. Thus the estimated local consumption of caustic soda is about 17,000 tonnes per year.

Assuming an average annual growth rate of 16.0%, the projected domestic consumption is expected to increase from 26,197 tonnes of caustic soda per year in 1985 to 54,499 tonnes in the year 2000 (as shown in Table 3).

TABLE 3 - PROJECTED DOMESTIC CONSUMPTION OF CAUSTIC SODA (TONNES)

1985	1990	1995	2000
26,197	35,631	45,065	54,499

1.4.2. Export Market:

The Eastern and Southern African countries offer a ready export market. Potential target markets are Ethiopia, Madagascar, Malawi, Mauritius, Tanzania, Uganda, Zambia and Zimbabwe. These countries depend entirely on import for their requirements of caustic soda. No major industry exists in the sub-region.

The total demand is put at about 25,000 tonnes of caustic soda per year.

1.5. Plant Capacity and Manufacturing Process:

Plant Capacity: A production capacity of 30,000 tonnes of caustic soda per year is envisaged. The capacity is based on three shifts of 8 hours per shift, working for 300 days per year.

Manufacturing Process: The chemical process is based on the causticisation of soda ash (sodium carbonate) with slaked lime (calcium hydroxide) to yield dilute caustic soda (sodium hydroxide) and calcium carbonate.

$Na_2CO_3 + Ca(OH)_2 = 2NaOH + CaCO_3 + 2060$ K cal.

The process takes place in steps:

1. Limestone is burnt in lime kiln to obtain lime.

2. The lime is slaked in rotary slakers, with weak wash water and refined by separating the grits. The slaked lime, so prepared, is fed into a steam-heated causticiser.

3. Simultaneously, soda ash, dissolved in weak wash, is fed into that causticiser.

4. Both liqours are then mixed and agitated in the first and second causticisers to form a solution of sodium hydroxide, sodium carbonate and sodium sulphate, in which calcium carbonate, also formed, remains suspended.

5. The calcium carbonate is removed from the weak caustic solution in the first multiple tray thickner. The solution, containing about 10% sodium hydroxide, is discharged into a storage tank.

6. To obtain a maximum yield of caustic soda, the slurry, containing calcium carbonate, is passed into the third and final causticiser where it is mixed with fresh filtrate and soda solution and then sent a second clarifying thickner.

7. In this thickner, the slurry is separated, washed and then fed, through a homogeniser, to the rotary filter plant.

8. The precipated calcium carbonate is separated in the filter plant from the mother liquor by filtration.

9. The wash liquors from the second clarifying thickner and the filtration plant are re-cycled for dissolving soda ash and fished salts.

10. The precipitated calcium carbonate can be calcined or burnt again in the lime kiln, with fresh limestone, to obtain lime. This is slaked to calcium hydroxide and recyled to the causticer to react again with fresh soda.

11. The weak caustic soda solution, containing some unconverted salts, is concentrated by steam heating, from about 10% NaOH content to about 50% NaOH content in multiple effect evaporators. The salts, sodium sulphate and sodium carbonate crystallize and are separated in the vaccum filter.

12. The salts are dissolved and recyled to causticisation process.

13. The 50% NaOH is further concentrated to about 97% NaOH solid, which is then packed, ready for sale.

1.6. Annual Production:

1.6.1. Operative life of ten years is planned. Production starts 2 years after construction. Plant efficiency is expected to increase from 60% in the 1st year to 80% in the 2nd year and then to 100% in 3rd and subsequent years of operation.

1.6.2. Annual Expected Output:

	Yr. 1	Yr. 2	Yr. 3	Yr. 10
Output (tonnes)	18,000	24,000	30,000	30,000
Sales ('000 US$)	2493.9	3523.5	4384.9	4458.4

1.6.3. Pricing Policy:

The selling prices of caustic soda have to determine by reference to the competitors' landed prices for Kenya and Uganda and the CIF prices in other Eastern and Southern African countries.

For Kenya and Uganda, ex-works price of US$160 per tonne (or US$ 155.20 net per tonne) has been used.

For other PTA countries, a C and F price of US$160 per tonne (or US$145.50 net per tonne) is fixed.

N.B. Prices are based on 1978 figures. Owing to escalating costs and the devaluation of Kenya shilling against the US dollar, prices must be higher now.

1.7. Availability and Cost of Manpower, Raw Materials and Utilities:

1.7.1. Availability of Inputs:

Soda ash and limestone are abundantly available. Over 200,000 t.p.y. of soda ash are produced from trona (sodium sesqui-carbonate, $Na_2CO_3 . NaHCO_3 . 2H_2O$) by Magadi, some 120 km. from Nairobi. Trona deposits at Lake Magadi are estimated at over 100 million tonnes and are renewable.

Limestone is currently being exploited from over seven quarries. Chemical analysis of the Likoni limestone, some 13 km. from Mombasa, has proved to be the most satisfactory. Other chemicals required in small quantities will have to be imported.

Labour is sufficiently available. Manpower requirements add up to 194 persons. It is expected that a certain amount of training will be necessary.

Fuel oil and power are available. Fresh water supply is extremely limited. Cooling water could be obtained from the sea.

1.7.2. Cost of Inputs (at full production)

Raw Materials (Consumption per tonne of Caustic Soda)

	US$	US$
Soda ash (1.45 tonnes at $35.01/t)	50.76	
Quick lime (0.80 tonnes at $15.41/t)	12.33	
Sodium nitrate (0.004 tonnes at $84/t)	0.34	
Sulphur (0.001 tonnes at $112/t)	0.11	
Hydrochloric acid (0.001 tonnes at $49/t)	0.05	63.59
Utilities (Consumption per tonne of Caustic Soda).		-
Fuel Oil (0.531 tonnes at $14.63)	7.77	
Power (200kWh/t at $0.0196)	3.92	
Water		
(a) Cooling (168m^3/t at —)	-	
(b) Process (14.37m^3/t at $0.6442 per 1,000g)	2.04	13.73
Manpower Costs:		
Salaries and Wages		11.94

Production Cost Per Tonne

US$

Yr.	1	2	3	4	5	6	7	8	9	10
	154.56	136.44	125.52	124.61	123.77	122.99	122.24	121.76	122.31	122.92

1.8. **Plant Location and Availability of Infrastructural Facilities:**

It is planned to locate the plant at Mombasa. Availability of raw materials here is good. Being near the sea, the source of adequate water for cooling is excellent. Transportation facilities in terms of road, rail and sea are excellent. There are good supplies of fuel oil and power. Facilities for waste disposal or effluent discharge are excellent.

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2. Financial Aspects

2.1. Total Investment Costs

The total investment outlay is US$6.58 million.

	Local Currency Component ('000US$)	Foreign Currency Component ('000 US$)	Total ('000 US$)
A. FIXED INVESTMENTS			
Land and Land Development	140	-	140
Buildings	322	-	322
Machinery and Equipment (F.O.B.)	105	3,318	3,423
De-salination Plant (C.I.F)	50	450	500
Freight, insurance, port charges and transportation to site.	35	267	302
Vehicles, Furniture and Office Equipment.	34	-	34
B. PRE-PRODUCTION CAPITAL EXPENDITURES			
Inspection, Installation and Start-up	178	400	578
Technical and Engineering Services	-	311	311
Construction Overheads	96	-	96
Interest During Construction	-	356	356
Contingencies	57	246	303
C. WORKING CAPITAL	210	-	210
TOTAL	1,227	5,348	6,575

2.2. Project Financing:

Proposed financial structure indicating expected sources and terms of equity and loans.

	Local Sources (in US $)	Foreign Sources (in US $)	T o t a l (in US $)
Equity	805,440	838,310	1,643,750
Long-term Loan	-	1,431,250	1,431,250
Suppliers Credit	-	3,500,000	3,500,000
Short-term Loan	-	-	-
	805,440	5,769,560	6,575,000

2.2.1. N O T E S:

1. Debt-equity ratio is 3:1
2. Majority shareholding of 51% of total equity is taken by the foreign partner, Lahore Investment Ltd of Pakistan.
3. 71% of the total loan requirements is in the form of suppliers credit.

2.3. Information on Profitability and Return on Investment.

- Pay-back period:

The pay-back period is calculated from the net profit after tax plus interest plus depreciation.

Investment outlay of US$6,575 million is recovered after 5.4 years of operation. If it is assumed that the value of land ($140,000) and of working capital ($210,000) will be fully regained at the end of the project, then an investment outlay of $6,225 million will be recovered after 5.1 years of operation.

- Return on Equity:

Return on equity based on net profit after interest and tax is calculated for year 3 the first year of full-capacity production and Year 5, after expiration of tax holidays.

Year 3 : $\frac{650,000}{1,643,750} = 39.54\%$

Year 5 : $\frac{682,000}{1,643,750} = 41.49\%$

- Break-even Point:

Operating rates cover all costs including depreciation of plant facilities. All costs are split into variable costs which would vary directly with production rate, and fixed costs, that would not change with operating rate.

It is assumed that plant will operate at full capacity from the 3rd year. Break-even point works out to 21,005 tonnes or 70%.

3. Foreign Contribution Desired:

Equity participation from PTA member-countries and a joint-venture technical partner will be appreciated. Participation by foreign partner in the form of technical and engineering services and supply of plant and equipment is welcome.

4. Project Study Available

A feasibility study on the project is available.

D. GENERAL REMARKS

Our analysis shows the project to be profitable. The study however requires up-dating. The abundant and easily accessible reserves of high grade natural soda ash and good quality limestone in Kenya makes the manufacture of caustic soda by the chemical process an attractive proposition.

The project is recommended for the following additional reasons:

(1) There is no production of chlorine by the method used;

(2) Consumption of electrical energy is low;

(3) The project is resource-based;

(4) It is import-substituting;

(5) It is an intermediate goods project, having a tremendous backward and forward linkage effects;

(6) There is a market for the proposed product;

(7) The project is financially viable and technically feasible; and

(8) There is a substantial saving in foreign exchange.

ANNEX E

INDUSTRIAL INVESTMENT PROJECT PROFILE

Project Title: MANUFACTURE OF TRANSFORMERS

Country: Z A M B I A.

A. BACKGROUND INFORMATION

The manufacture of electrical equipment is of major interest to Zambia. The country's rich copper deposits gives it an advantage to manufacture and export products using this metal.

Two related reports, namely the IDU Report on "Development of Power Cable Industry in Zambia" and Electrical and Distribution Equipment in SADCC Maseru documentation have earlier highlighted the need for and the export potentials of a manufacturing plant which would make use of Zambian copper in manufacturing products such as transofrmers and electric motors.

In 1980, a UNIDO team of Czechoslovakia experts carried out a Feasibility Study on the production of Irrigation Equipment in Zambia. In their final report - Project No. DP: Zam: 008 of June, 1981, the team had mentioned that for the irrigation system, the country would need about 1,050 to 1,200 distribution transformers by 1990.

Consequently, at the request of the Government of Zambia, the Industrial Development Unit of the Commonwealth Fund for Technical Co-operation (IDU/CFTC) undertook investigations into the possibilities for the manufacture of Electric Motors, Transformers and Switchgear in Zambia.

In 1983, a team of experts were sent by the IDU/CFTC to carry out investigations and to collect data in Zambia and their report was submitted the same year.

B. COMPETITORS

As of 1983, the annual demand for power transformers and electric motors were being met completely through imports from the industrialised countries. A major part of the distribution transformers consumed was also imported.

Competitors Outside the Sub-Region

As the imports situation earlier mentioned reveal, the competitors outside this region are mostly manufacturers in the industrialised countries.

Competitors Inside the Sub-Region

A part of the demand for distribution transformers is being catered for by the only local manufacturer - Messrs. South Wales Electric Zambia Limited. However, the Company does not cover the popular range but only the range up to 500 KVA. Presently, the company is working at a very low production rate although it has a rated capacity of around 500 nos/year. The factory equipment appears to be rather old and the company does not undertake any fabrication work.

There is, however, no indigenous manufacture of electric motors. Kenya also proposes to manufacture Transformers utilising part of the 15 million metres of copper cables produced in the country. It is believed that the local Kenyan market can support its establishment.

C. INFORMATION ON THE PROJECT

1. Technical Aspects

1.1. Status of Project: It is a new enterprise.

1.2. Products to be manufactured :

Distribution Transformers and Electric Motors.

1.3. Main Input Materials :

For Transformers: Insulation Materials, HV Copper, Lamination and LV Copper, Steel Channel Sections & Angles, Radiator Tubes, Transformer Oil.

For Motors: Castings, Copper Wire, Stampings, Aluminium, Steel Bar, Insulation.

1.4. Market (Export, Local) :

1.4.1. Export :

- Africa particularly PTA countries; about 15% of production has been assumed for export.

1.4.2. Local :

- For Electric Motors, the major consumers in the country include Government Agencies pertaining to Rural Development, viz APE Limited. Others include mines and individual farmers. The agricultural sector needs electric motors mainly as drive for pumps.
- The major consumers of transformers are Zambian Electricity Supply Corporation Ltd (ZESCO) and Copperbelt Power Corporation (CPC).

1.4.3. Present Domestic Demand:

For the agricultural sector, total demand for electric motors works out to about 2,000 to 2,500 nos. per year with the range of 1HP to 75HP. The mining sector also has a large number of motors installed mainly as drives for various machinery and also drives for pumps. Most of the motors here are procured along with the original equipment and recurring demand is mainly against replacement

being about 200 nos/year. ZESCO needs about 2 nos/year of 5MVA power transformers. For CPC, about 6 - 8 nos/year of power transformers in the range of 5 - 85 MVA are consumed. Major portion of the demand of distribution transformers by ZESCO and the mining sector is covered through imports. A part of their demand, up to 500 KVA range, is met locally by South Wales Electric Zambia Limited, which has installed capacity of 500 - 600 nos/year of 16 - 500 KVA distribution transformers. Table I below shows consumption by ZESCO and the mining sector of South Wales' 16 - 500 KVA transformers :

TABLE I

	1980	1981
ZESCO	120	200
Mines	300	100

1.4.4. Eastern and Southern African Market:

The Eastern and Southern African countries constitute a ready market for the products of the plant in view of their proximity. The availability of copper locally gives Zambia an edge over the other neighbouring countries and as such, there are good chances of exporting these goods to these countries.

Furthermore, manufacture of transformers and electric motors within Zambia would give an assured market for a part of the winding wire to be manufactured by ZAMEFA and would eventually

make these products competitive even for export to the neighbouring countries. Around 15% of annual production of distribution transformers and electric motors has been assumed for exports.

1.4.5. Estimated Domestic Demand:

The estimated demand for transformers and electric motors up till 1990 is shown in the Table below :

PRODUCT	DEMAND TILL 1990
Power Transformers (5 - 85 MVA)	8 - 10 nos/year
Distribution Transformers (16-2000KVA)	1,600 nos/year
Electric Motors (1-30 HP)	3,300 nos/year
Electric Motors (30-75HP)	200 nos/year.

Demand for electric motors and transformers is likely to increase in the future in view of the rural electrification programme of Zambian Electrical Supply Corporation (ZESCO) which is designed to electrify the rural areas in order to intensify the agrarian revolution.

In 1981, a UNIDO team that conducted a Feasibility Study on the production of irrigation equipment in Zambia estimated that the country would need about 1,200 distribution transformers by 1990.

Furthermore, in its "National Development Plan" as well as in "Operation Food Production 1980-1990" the Zambian Government declared its objective for increased agricultural outputs. This justifies the future demand as earlier estimated.

1.5. Plant Capacity and Manufacturing Process:

Plant Capacity: A production capacity of 1,260 Distribution Transformers and 3,600 units of electric motors per annum is estimated.

Manufacturing Process: The transformer manufacturing process involves winding, insulating, assembly, laminating, fabricating, packing and despatching. Electric motor manufacturer entails winding, assembly, testing, painting and packing.

1.6. ANNUAL PRODUCTION

1.6.1. An operation period of 15 years is planned. Plant will start production in Year 2. The production programme envisages that the plant will operate at a capacity of 40% in Year 2 and reach a capacity of 80% and 100% in Years 4 and 5 (and subsequent years) respectively.

YEAR	QUANTITY (UNITS)	UNIT PRICE (K)	ANNUAL TURNOVER (K)
2	1,960	1,792	3,514,280
3	2,940	1,592	46,804,800
4	3,920	1,592	6,240,640
5	4,900	1,592	7,800,000
'	'	'	'
'	'	'	'
'	'	'	'
15	4,900	1,592	7,800,000

1.6.2. Pricing Policy

The current (FOB) prices for electric transformers average around US$24 per KVA. Current prices of imported transformers arrived in Zambia (after covering sea freight, insurance, customs duties, inland transport, handling, etc. at 31% of F.O.B. value) averages K34.55 per KVA.

For projecting, a price similar to the imported price assumed but exclusive of customs duty (equivalent to FOB put 20%) averaging K.31.65 or K.3.20 per KVA.. For electric motors, the price ranges from K.28 per hp to K.40 per hp.

1.7. Availability and Cost of Manpower, Raw Materials and Utilities (Power, Water, etc) :

Availability of Inputs: Transformers and electric motors use enamelled copper wire for their windings. ZAMEFA (Metal Fabricators of Zambia Limited) has currently embarked on the manufacture of such wire. The quality of their product is expected to be high. Power supply is available in adequate amounts. Skilled labour, however, is not abundant.

Cost of Inputs: The availability of power and copper wire locally is expected to lessen the cost inputs. At full capacity, cost of manpower at current salary/wage levels is estimated at K389,000. Annual cost of production is calculated to be K2,362,000.

1.8. Plant Location and Availability of Infrastructural Facilities:

It is proposed to locate the plant in most populated belt around the railway line and highway from Livingstone to Lusaka since the infrastructure in this area is highly developed.

2. FINANCIAL ASPECTS

2.1. Total Investment Costs: Total investment cost, broken down into land, construction, installed equipment and working capital, indicating foreign exchange component :

		LOCAL CURRENCY COMPONENT (K'000)	FOREIGN CURRENCY COMPONENT (K'000)	TOTAL (K'000)
A.	Fixed Investment Costs			
	Land	-	-	-
	Buildings, Site Development	1,182	968	2,150
	Machinery and Equipment	-	2,145	2,145
B.	Pre-production Capital Expenditures			
	Preliminary Expenses	20	-	20
	Project Engineering Cost	-	125	125
	Construction Management Expenses	-	450	450
	Training Costs	-	100	100
	Start-up Expenses	50	-	50
	Contingencies	225	-	225
C.	Interest During Construction	237	-	237
D.	Working Capital	206	-	206
	TOTAL INVESTMENT COSTS	1,920	3,788	5,708

2.2. Project Financing: Proposed financial structure, indicating sources and terms of equity and loans :

The operating company's capital structure is assumed to be based on a debt: equity ratio of 1.7:1

Minority shareholding by a foreign partner is taken at 49%.

Long-term loan repayment in 10 years is assumed to carry an interest rate of 13.5% per annum while Short-term borrowings for working capital carry an interest rate of 12% per annum.

	LOCAL SOURCES (K'000)	FOREIGN SOURCES (K'000)	TOTAL (K'000)
Equity	1,099	1,056	2,155
Loans (Long-Term)	3,510	-	3,510
Short-Term Loans, Overdraft	43	-	43
T O T A L	4,652	1,056	5,708

2.3. Information on Profitability and Return on Investment:

Assuming a total annual sales of K7,801,000,

- Internal Rate of Return on Equity is 15.3%
- Internal Rate of Return on Total Capital is 16.9%
- Payback period works out to be approximately 4 years.

3. Foreign Contribution Desired:

In addition to the Swedish support, Zambia will welcome participation by other PTA countries. Loans are also required. Swedish licence and know-how will be needed.

Access to foreign markets outside the PTA sub-region is not necessary since it is not likely that demand will be met. Other contributions such as Management, Training and Technical Assistance are to be included in Agreements with the Swedish Technical Partner.

4. Project Study Available: A Peasibility Study is available.

C. GENERAL REMARKS

The manufacture of transformers and other electrical equipment is of particular interest to Zambia. It has substantial backward linkage effect. The industry will largely help in developing core and related industries such as foundries and forges, metallurgical and electronics industries.

It has been recommended that this project be up-graded into a Sub-Regional Project to manufacture about 3,000 MVA transformers per year. It should be noted that Kenya plans in the current Plan period to develop projects for the production of the following items :

(a) overhead transformers and switchgears; and

(b) electrical motors and generators.

ANNEX F.1.

INDUSTRIAL INVESTMENT PROJECT PROFILE

Project Title: MANUFACTURE OF SHEET GLASS

Country: ZAMBIA.

A. BACKGROUND INFORMATION

Various thoughts of establishing a Sheet Glass plant in Zambia have long existed. During the early seventies, Kapiri Glass Product Limited considered the possibility of installing an additional production line for sheet glass with a yearly capacity of 2,500 tonnes. At the end of 1977, the Development Bank of Zambia carried out a small investment opportunity study concerning a sheet glass plant.

These reports generally favoured the idea of establishing a sheet glass project. However, no conclusive judgement about the feasibility of the project was given. In January, 1981, Tebodin Consulting Engineers was therefore commissioned by INDECO Limited to carry out a feasibility study on a sheet glass plant in Zambia. The study recommended the establishment of a plant with an annual capacity of 15,000 - 20,000 tonnes. In September, 1981, INDECO Limited re-evaluated the study. The new proposal envisages a plant capacity with an annual output of 12,000 tonnes of saleable glass, using the Improved Pittsburgh Process.

B. INFORMATION ON THE PROJECT

1. TECHNICAL ASPECTS

1.1. Status of Project: It is a new enterprise still to be established.

1.2. Product(s) to be manufactured:

Glass Sheet, with average glass thickness of 3.88 mm.

1.3. Main Input Materials:

Six main inputs are used: treated sand, soda ash, dolomite, limestone sodium sulphate, and feldspar.

Iron and chromium contents of the raw materials are of paramount importance since they affect the colour and hence the quality of the produced glass. It will be necessary to use additives to decolourize the sheet glass produced. Selenium and cobalt oxide are the suggested additives.

1.4. Market (Export, Local)

Local and Export:

The demand for sheet glass in Zambia and in foreign markets is derived demand dependent on the level of economic activity and, in particular, the construction industry.

1.4.1. Local Market:

Investigations show that consumption of glass has been steady since 1981. It has increased from 2,323 tonnes in 1975 to 3,396 tonnes in 1981 at an average annual growth rate of 6.6%. This has been attributed to several constraining factors such as lack of foreign exchange to import glass and other basic building materials for the construction industry. Table 1 shows past domestic consumption.

TABLE I - PAST DOMESTIC CONSUMPTION (TONNES)

1975	1978	1981
2,323	2,936	3,396

Assuming a growth rate of about 8.653%, a projected demand shows that consumption will increase from 4,317 tonnes in 1987 to 9,920 tonnes in 2001. Table 2 below shows the projected domestic consumption.

TABLE 2 - PROJECTED DOMESTIC CONSUMPTION (TONNES)

1987	1991	2001
4,317	6,185	9,920

1.4.2. Export Market:

Potential target markets in the Eastern and Southern African sub-region are Angola, Tanzania, Malawi, Mozambique, Zimbabwe and Botswana. Zaire is also one of the most promising export markets. Competition is expected from the proposed 15,000 tonnes/year plant in Dar-es-Salaam, Tanzania. and later from Kenya if their glass sheet project ever materialises.

Projected demand for export market is shown in the table below :

PROJECTED EXPORT DEMAND

YEAR	TONNES
1987	483
1991	3,370
2001	880

Owing to higher demand in the home market, sheet glass exports will decrease in the year 2001.

1.5. Plant Capacity and Manufacturing Process:

Plant Capacity: A plant size of 12,000 tonnes annually is envisaged, working 300 days/year.

Manufacturing Process: Five manufacturing processes are considered: Float Glass, Libbey Owens, Fourcault, Asahi (Improved Fourcault) and Pittsburgh processes. The Pittsburg process is recommended.

The sheet glass forming process takes place in a sequence of stages and process operations. The process serves to transform the batch mix of specially prepared solid raw materials into glass sheets, by means of controlled physical-chemical processes.

The main stages of the technological process are :

(a) Unloading and storing of raw materials;

(b) raw materials preparation;

(c) weighing, batching and mixing of raw materials;

(d) melting;

(e) sheet glass drawing;

(f) initial and final cutting of the glass; and

(g) inspection, packing, storing and dispatch.

1.6. Annual Production :

1.6.1. It is assumed that production will start in 1987. Plant efficiency is expected to increase from 40 - 75% in the 3rd year and reach 90% in the 13th year. After every four years, the furnace is overhauled and other related repairs are done. This brings the efficiency of the plant to 50% of the drawn quantity during this period.

1.6.2. Annual Expected Output:

	1987	1988	1989	1990	1991	1992	1993
Output ''000 t)	4.8	7.2	9	9	6	9	9
Sales (m K)	11.8	15.68	17.67	18.12	15	19.12	19.67

	1994	1995	1996	1997	1998	1999	2000	2001
Outpuy ('000 t)	9	9	6	9	9.6	10.8	10.8	6
Sales (m K)	20.2	20.9	15.6	22.3	23	25.97	28.85	15.6

1.6.3. Pricing Policv :

For the local market, K2,600 per tonne has been used. The price is exclusive of all duties and taxes. The export price is fixed at K1,200 per tonne.

1.7. Availability and Cost of Manpower, Raw Materials and Utilities (power, water, etc.) :

Availability of Inputs: With the exception of Soda Ash and Sodium Sulphate which are to be imported, other raw materials are available locally. Soda ash could be obtained from Kenya. Auxilliary materials will be required and these include timber for making packing crates, packing paper and nails. Timber can be obtained locally from Ndola, nails from Lusaka. Packing paper may be imported.

Labour is sufficient. Manpower requirements amount to 271 people of which 19 are highly skilled, 86 are skilled, 133 semi-skilled and 33 unskilled. Training abroad is proposed for some essential workers.

Electricity and water supply are available.

Cost of Inputs (at full production)

Raw Materials	K	K
Sand (9,900 tonnes at K.4.50/t	44,550	
Soda Ash 2,940 tonnes at K399.86/t	1,175,588	
Dolomite 2,220 tonnes @ K10/t	22,200	
Feldspar 303 tonnes @ K200/t	60,600	
Limestone 465 tonnes at K100/t	46,500	
Sodium Sulphate 165 t @ K292.45/t	48,254	
Other Chemicals	20,000	
T O T A L		1,417,692
Utilities		
Fuel Oil 7,000 t @ K200.45/t	1,403,150	
LPG 600 t @ K475.18/t	285,108	
Water 45,000m^3 @ K0.43/m^3	18,900	
Electricity 3,600,000 kWh @ K0.015/kWh	117,375	
		1,824,533
Manpower Costs		
Salaries, Wages and Contingencies:		2,071,000

1.8. Plant Location and Availability of Infrastructural Facilities :

Plant location is Kapiri Mposhi. It has the following advantages: sand deposits are sufficiently available; convenient road and railroad transport; abundant supply of water, good electricity supply; waste disposal facilities available. Transport cost and transport volume expressed in thousand t/km/year for raw materials, fuel and finished products are in favour of Kapiri.

2. FINANCIAL ASPECTS

2.1. Total Investment Costs

Total Investment outlay is projected at K56,869,000 including the first year's working capital requirements.

	Local Currency ('000 K)	Foreign Currency ('000 K)	T o t a l ('000 K)
A. FIXED INVESTMENT			
L a n d	-	-	-
Building and Civil Works	10,000	-	10,000
Plant & Equipment	-	23,511	23,511
Seafreight and Insurance	-	3,500	3,500
Clearing and Forwarding	1,353	-	1,353
Erection and Commissioning	500	2,040	2,540
Vehicles, Furniture and Fixtures	437	-	437
B. PRE-PRODUCTION CAPITAL EXPENDITURE			
Pre-Production Expenses	5,636	2,250	7,886
Design, Engineering, Know-how and Training	-	1,720	1,720
Contingency 10%	1,280	2,700	3,980
C. WORKING CAPITAL	773	1,169	1,942
T O T A L	19,979	36,890	56,869

2.2. Project Financing :

Proposed financial structure, indicating expected sources and terms of equity and loans.

	Local Sources ('000 K)	Foreign Sources ('000 K)	T o t a l ('000 K)
E q u i t y	9,424	9,054	18,478
Long-term Loans, Supplier's Credit	9,782	27,836	37,618
Short-Term Loan, (Bank Overdraft)	-	773	773
T O T A L	19,979	36,890	56,869

2.2.1. N O T E S:

1. Debt-equity ratio is 2:1
2. Long-term foreign loan/supplier's credit is obtainable at 10% interest rate payable over 10 years (IBRD - K12,000,000; ADB - K9,000,000 and EDF - K6,836,000).
3. Local long-term loan is assumed at 15% interest payable over 15 years.
4. Minority share-holding in equity is assumed - preferably by supplier of technology and 49% of total equity.
5. Local overdraft is obtainable at 15% interest.
6. The assumed grace period is 2 years for both local and foreign long-term loans.

2.3. Information on Profitability and Return on Investment :

- Payback period is 5.5 years
- Internal Rate of Return on total capital is 14%
- Break-even point works out to 7,200 tonnes or 60%.

3. Foreign Contribution Desired

The Government will appreciate equity participation of PTA member-countries and a joint-venture technical partner.

4. Project Study Available:

A feasibility study on the project is available.

C. GENERAL REMARKS

Although this project may appear quite profitable, it is necessary to give preference to countries like Kenya, Ethiopia, and possibly Madagascar, that have most of the essential raw materials particularly soda ash. Apart from the fact that Zambia does not produce soda ash, it is a land-locked country. Transportation of a fragile product like glass sheet will definitely place Zambia in a disadvantageous position vis-a-vis the other countries that are also proposing to manufacture the product.

ANNEX F.2.

INDUSTRIAL INVESTMENT PROJECT PROFILE

Project Title: HAND TOOLS AND CUTLERY PLANT

Country: ETHIOPIA.

A. BACKGROUND INFORMATION

The term, industrial hand tools, refers here to tools such as wrenches, spanners, pliers, pincers, screw drivers, etc., which are commonly used in the Ethiopian industries, repair shops, garages, etc. The Ethiopian economy being an agrarian economy, such tools are not widely used in the country. The limited demand for such tools is at present met by imports.

An attempt was made in the past to produce domestically at the Ethiopian Metal Tools Factory, some industrial hand tools like pliers, pincers, wire cutters, screw drivers and chisels. However, it had to be discontinued because of lack of market, mainly attributed to the poor quality of the products.

It is generally felt that the country's demand for industrial hand tools will grow rapidly in the coming years. In line with this and following the request by the National Metal Works Corporation, a proposal was submitted by FATA European Group S.P.A. for tools and cutlery manufacturing plant to be integrated to the Industrial Spare Parts Plant in order to :

(1) minimise the investment cost of the plant; and

(2) improve the plant utilisation in the starting years.

The proposal envisages an annual one shift capacity of 1,600,000 pieces of 42 types of industrial hand tools and 600,000 pieces of 12 types of domestic cutlery.

B. INFORMATION ON THE PROJECT

1. TECHNICAL ASPECTS

1.1. Status of Project: It is a new enterprise.

1.2. Product(s) to be Manufactured:

- Industrial Hand Tools, e.g. pliers, pincers, wrenches, etc.
- Domestic cutlery, e.g. forks, spoons, knives, etc.

1.3. Main Input Materials:

- Tool Steel
- Stainless Steel.

1.4. Market (Export, Local, etc.): - Local

A general survey of the import statistics shows that the past imports of industrial hand tools and domestic cutlery fluctuate up and down showing a declining trend in general.

Past imports are as follows :

	INDUSTRIAL HAND TOOLS		DOMESTIC CUTLERY	
	TONS	'000 pcs.	TONS	'000 pcs.
1975	—	-	25	759
1976	29	37	-	-
1977	—	-	112	2,482
1978	182	344	-	-
1982	32	34	33	1,082
1983	75	93	33	1,082

The future demand for the products was forecasted using alternative techniques after making adjustments on the historical data to smoothen the fluctuations. The result of the most reasonable forecasts was found to be as follows :

	INDUSTRIAL HAND TOOLS		DOMESTIC CUTLERY	
	TONS	'000 pcs	TONS	'000 pcs
1985	107	286	33	943
1990	144	381	43	1,228
1995	193	514	57	1,628
1997	217	578	64	1,828

The forecast shows that there is more market to domestic cutlery than the envisaged capacity while it is the reverse for industrial hand tools.

1.5. Plant Capacity and Manufacturing Process :

Plant Capacity: The offered plant is designed with the following annual capacity :

- Industrial Hand Tools - 1,600,000 pieces/shift
- Domestic Cutlery - 600,000 pieces/shift.

Manufacturing Process: The envisaged manufacturing process involves material preparation - fabrication - machining - assembly - finishing.

1.6. Annual Production:

1.6.1. The plant production programme is worked out in line with the market requirement without exceeding a maximum capacity of 2,200,000 pieces of tools and cutlery/shift/year. The plant can start production in June, 1987. (The demand for cutlery was adjusted by a factor of 0.9 to account for weight to pieces conversion errors and to delete special purpose cutlery which might not be produced at the plant but which may be included in the imports statistics).

	INDUSTRIAL TOOLS			CUTLERY		
	Quantity ('000Tonnes)	Unit Price Ex-Factory	Annual Turnover (in '000 Birr)	Quantity ('000 t)	Unit Price Ex-Factory	Annual Turnover ('000 Birr)
1987	160	10Birr/pc	1,488	470	1Birr/pc	437
1990	330	"	3,534	1,100	"	1,023
1994	480	"	4,464	1,390	"	1,293
1997	580	"	5,394	1,620	"	1,507

Plant will operate at a capacity of about 57% in 1987 and reach a capacity of about 85% and 100% by 1994 and 1997 respectively.

1.6.2. Pricing Policy:

The ex-factory price has been adopted. For the industrial hand tools, a price of 10 Birr/piece is proposed. A price of 1 Birr/piece is quoted for the cutlery.

1.7. Availability and Cost of Manpower, Raw Materials, and Utilities (Power, Water, etc.):

Availability of Inputs: Tool steel and stainless steel are not available locally and should therefore be imported. The total number of persons proposed is 106 (Manager 1; Technicians 5; Workers 100). Power is to be installed.

Cost of Inputs (at full capacity)

		('000 Birr)
Raw Materials:		
Tool Steel (5,000 Birr/ton) Stainless Steel (6,500 Birr/ton)	1,506	
Auxillary Materials	482	
		2,088
Utilities		135
Manpower Costs		
Salaries & Wages	216	
Fringe Benefits	22	
		238

1.8. Plant Location and Availability of Infrastructural Facilities :

The plant is proposed to be located in Addis Ababa. Infrastructural facilities such as road and railroad transport, water and power supply are available.

2. Financial Aspects

2.1. Total Investment Costs :

	Local Currency Component ('000 Birr)	Foreign Currency Component ('000 Birr)	T o t a l ('000 Birr)
A. FIXED INVESTMENT			
Land and Site Preparation	200	-	200
Building and Civil Works	1,828	1,543	3,371
Plant, Machinery & Equipment	930	17,986	18,916
Erection	120	497	617
Furniture	200	-	200
Power and Water Supply Connection	200	-	200
Contingency (10% local Cost)	338	-	338
			23,842
B. PRE-PRODUCTION EXPENDITURE			
Detail Engineering	72	828	900
Product and Production Engineering	30	447	477
T r a i n i n g	1	124	125
Test-Run and Project Management	50	100	150
Interest During Construction	68	-	68
Contingency	5	5	10
			25,572
C. INITIAL WORKING CAPITAL	1,175	-	1,175
T O T A L	5,217	21,530	26,747

2.2. Project Financing

Proposed financial structure, indicating expected sources and terms of equity and loans.

2.2.1. Government Equity: 15% of initial fixed investment cost plus all domestic costs plus test-run and project management cost.

2.2.2. Supplier's Credit: 85% of initial fixed investment cost plus pre-production expenditure minus test-run and project management and interest during construction period.

Terms:
- 5 years repayment
- 3 years grace period
- 9.5% simple interest per annum.

2.2.3. AID Bank Loan: Initial Working Capital :

Terms:
- 7 years repayment period
- 10% interest rate per annum.

2.2.4. Overdraft from Commercial Bank: Increase in working capital plus cash deficit during plant operation.

Terms: - 10% interest per annum.

	Local Source ('000 Birr)	Foreign Source ('000 Birr)	T o t a l ('000 Birr)
Equity	7,361	-	7,361
Long-Term Loan	1,175	-	1,175
Supplier's Credit	-	18,211	18,211
T O T A L	8,536	18,211	26,747

2.3. Information on Profitability and Return on Investment :

- Profit and Loss Statement shows that the plant will be losing all the time till 1997, 10 years after production start-up.

(in '000 Birr)

	1987	1990	1994	1997
S a l e s	1,925	4,557	5,757	6,901
Production Cost	2,719	7,319	6,801	5,707
Profit (Loss) Before Tax	(794)	(2,762)	(1,044)	1,194

- Internal Rate of Return (IRR) on equity is negative.
- Internal Rate of Return (IRR) on total capital is 3.7%.
- A sensitivity analysis shows that a 20% increase in production will increase the IRR on total capital to 6.1%.

3. Foreign Contribution Desired:

Equity participation and loans will be required.

Management, training and technical assistance agreements will form part of the joint-venture agreement.

4. Project Study Available:

A pre-feasibility study is available.

C. GENERAL REMARKS

This project is being sponsored by the National Metal Works Corporation. Profitability study shows that the project will be losing till 1997, 10 years after production start-up. A detailed feasibility study, it is suggested, should be carried out.

ANNEX F.3.

INDUSTRIAL INVESTMENT PROJECT PROFILE

Project Title: COPPER FABRICATION PLANT

Country: Z A M B I A.

A. BACKGROUND INFORMATION

Next to the United States of America, Zambia is the fifth copper producing country in the world. Others are Soviet Union, Chile and Canada. Geologists estimate that the copperbelt is very old and represents a large part of Zambia, Angola, Zaire and Zimbabwe.

Intensive mining of copper ore began in the period 1927-30 and by the Second World War, copperbelt was one of the world's largest copper areas. Between 1969 and 1976, the copper production in Zambia was estimated at 700,000 tons.

The processing of copper pipes and electrical cables in Zambia is carried out by ZAMEFA, a subsidiary of INDECO Limited. Early in 1979, INDECO decided to build a new industrial plant in Zambia, with the major participation of the State, for copper flat product processing plant (plate and strips).

On the basis of an agreement between the Governments of Romania and Zambia, a team of Romanian experts visited Zambia in 1979 to conduct a feasibility study for a copper plate plant in Zambia.

In order to estimate the export possibilities of these products, the 'World Economy Institute of Romania' conducted a market study - International Market for Copper and Alloy Rolled Flat Products - in October, 1979.

Based on the domestic requirements, export possibilities and economic capacities for enterprise efficiency, the Romanian experts recommended in their report, the establishment of a copper plant capable of producing plates and strips in coil output of 10,000 tons per year with 0.5 to 2.00 mm thickness.

B. COMPETITORS

Between 1978 and 1979 the refined copper production in the world was over 9,000,000 tons out of which about 80 - 90% was meant for the production of copper and copper alloy products (wire, bars, sections, pipes, plates and strips).

Competitors Outside the Region:

Major competitors in copper production outside the Eastern and Southern Africa sub-region include the United States of America, West Germany, Japan, Canada and France. Table below shows the copper and copper alloy production for these countries between 1974 and 1978.

('000 tons)

COUNTRY	1974	1975	1976	1977	1978
U.S.A.	2,477	1,851	2,222	2,432	2,481
West Germany	945	780	972	935	1,007
Japan	1,307	1,177	1,495	1,555	1,716
France	560	476	516	579	585
Canada	291	226	258	259	289

Source: World Metal Statistics, London June, 1979.

Competitors Inside the Region:

Of the 752,000 tons of the refined copper production for the sub-region, in 1978, Zambia produced about 621,000 tons. This represents about 83% of the total refined copper production for the sub-region in 1978. Other major producers in the sub-region include Zaire and Zimbabwe with 103,000 tons and 28,000 tons produced in 1978 respectively. Table below gives details of refined copper production for the sub-region between 1970 and 1978.

COUNTRY	1970	1974	1975	1976	1977	1978
Zaire	190	255	226	66	99	103
Zambia	581	677	629	695	649	621
Zimbabwe	23	24	27	24	28	28

Source: World Metal Statistics, London, June, 1979.

C. Information On The Project

I. Technical Aspects

1.1. Status of Project: It is a new enterprise.

1.2. Products to be Manufactured:

Copper plates and strips in coils, having the thickness of between 0.5 to 2.0 mm and of 1,000 mm maximum length.

1.3. Main Input Materials:

Cathode copper and bundled scrap.

1.4. Market (Export, Local, etc.).

1.4.1. Export and Local

- Africa, particularly the Eastern and Southern Region as well as West and North Africa. (Major consumers include Kenya, Ethiopia, Zimbabwe, Tanzania, Mauritius in the sub-region and Nigeria, Algeria, Egypt, Ghana, Morocco and Tunisia in the rest of Africa.

- Europe and America.

1.4.2. Eastern and Southern African Market

This region is not a major consumer of copper products but constitutes a natural marketing zone for Zambian copper products as a result of their close communication links, geographic proximity and expressed desire for mutual trade and economic co-operation. Table below shows the Imports of Copper and Copper Alloy Rolled flats into selected countries in the sub-region in 1977 (in tons) :

COUNTRY	COPPER ROLLED FLATS	COPPER ALLOY ROLLED FLATS	TOTAL
Kenya	17	10	27
Mozambique	8	12	20

Source: NIMEXE 1st Series, 1977.

Table below gives the estimated importation of Rolled and Extruded Copper and Copper Alloy Products into Africa between 1970 and 1977 (tons) :

COUNTRY	1970	1976	1977
Morocco	3,053	4,000	5,900
Algeria	2,480	5,000	8,500
Tunisia	769	2,000	2,900
Ghana	976	1,200	1,700
Nigeria	2,300	4,354	3,200
Kenya	913	900	900
Libya	1,000	1,363	3,400
Ivory Coast	-	700	900
Egypt	350	4,082	4,800
Others	-	1,000	1,000
T O T A L	11,841	23,599	33,200

1.4.3. Demand for Copper Products in the Sub-Region:

As of 1966, the estimated demand for copper products by industry in the sub-region was put at 8,936 tons. This was expected to rise to 21,415 and 35,572 tons in 1975 and 1980 respectively. Table below indicates the estimated demand for copper products by industry in the sub-region within the stated periods :

INDUSTRY	1966 N	1966 %	1975 N	1975 %	1980 N	1980 %	AVERAGE GROWTH RATE (1975-1980) %
Mining	1,334	15.0	1,579	7.4	2,208	6.6	8
Engineering	1.200	13.0	5,816	27.2	10,709	31.9	17
Other Manufactures	516	5.8	1,565	7.3	2,228	6.6	8
Construction	2,625	29.4	6,504	30.4	10,543	31.4	12
Power	1,316	14.7	2,375	11.1	3,131	9.3	6
Transport	972	10.9	1,622	7.6	2,094	6.2	6
Communi-cation	963	10.8	1,954	9.1	2,660	7.9	7
TOTAL	8,936	100.0	21,415	100.0	33,572	100.0	

The table above shows that engineering is expected to be the largest generator of demand for copper products (mainly bare conductors used in making electric motors, transformers, resistors and rewinding and repairing electrical equipment). The construction industry is expected to be the most important user of insulated copper conductors.

1.4.4. Likely Future Demand

Assuming a constant annual growth rate of demand of 8% for the mining; 17% for the engineering; 8% for other manufactures; 12% for construction; 6% for both the power and transport and 7% for the communication industries, projected demand for the years 1985, 1990 and 1995 may be estimated as follows :

INDUSTRY	1985	1990	1995
Mining	3,245	4,768	7,000
Engineering	23,480	51,479	112,864
Other Manufactures	3,272	4,808	7,065
Construction	18,580	32,744	57,702
Power	6,336	8,479	11,347
Transport	2,803	3,750	5,039

The table of projected demand indicates that the engineering and construction industries will continue to be the major users of copper products up till 1995.

1.5. Plant Capacity and Manufacturing Process :

Plant Capacity: A production capacity of 10,000 tons per year of copper plates and strips in coils is estimated.

Manufacturing Process: The manufacturing process will involve raw materials preparation; melting and casting of copper blocks; block cutting and finishing; block reheating before rolling; hot rolling in fat strips; flat strip milling; cold rolling; anealing; checking; packing and shipping.

1.6. ANNUAL PRODUCTION

1.6.1. An operation period of 15 years is planned. The plant will start production in year 4, that is 3 years after implementation. The production programme envisages that the plant will operate at a capacity of 74% in year 4 and 100% by year 5 and subsequent years.

YEAR	QUANTITIES (TONNES)	UNIT PRICE FOB (US$)	ANNUAL TURNOVER (US$'000)
4	7,430	4,110	29,970
5	10,000	4,110	40,120
.	.	.	.
.	.	.	.
.	.	.	.
15	10,000	4,110	40,120

1.6.2. Pricing Policy: The export price (FOB) of the products have been assumed as US$4,110 per tonne.

1.7. Availability and Cost of Manpower, Raw Materials and Utilities (Power, Water, etc):

Availability of Inputs: The availability of copper locally will constitute a cost advantage. As of 1976 copper production in Zambia was over 700,000 tons most of which is exported as wire, bars, and cathode copper by MEMACO Company. Skilled labour, water and power supply are also available.

Cost of Inputs: Cost of inputs such as copper are expected to be relatively low in view of their local availability. Manpower cost will also be moderate since the plant will use much of the existing staff of ZAMEFA. At full capacity, the estimated operating cost of the plant is about US$25,748,000.

1.8. Plant Location and Availability of Infrastructural Facilities :

It is proposed to locate the plant in Luanshya, about 350 km North of Lusaka in the neighbourhood of ZAMEFA Enterprises. This location presents significant economic and social advantages such as :

1. Nearness to raw materials produced at Zambia Mining Copper Enterprise in Kitwe;
2. Availability of skilled personnel from ZAMEFA; and
3. Availability of electrical power and water.

2. FINANCIAL ASPECTS

2.1. Total Investment Costs Total Project Cost, broken down into Land, Construction, installed equipment and working capital indicating foreign exchange component :

		LOCAL CURRENCY COMPONENT (US$ '000)	FOREIGN CURRENCY COMPONENT (US$ '000)	T O T A L (IN US$ '000)
A.	FIXED INVESTMENT			
	Land	-	-	-
	Buildings and Civil Works	5,678	-	5,678
	Plant, Machinery and Equipment	1,514	27,853	29,367
	Site Preparation, Technological Tests & Contingencies	920	1,415	2,335
B.	PRE-PRODUCTION CAPITAL EXPENSES	2,693	5,227	7,920
C.	WORKING CAPITAL	3,430	410	3,840
	T O T A L	14,235	34,905	49,140

2.2. PROJECT FINANCING Proposed financial structure indicating expected sources and terms of equity and loans:

The operating company's capital structure is assumed to be based on a Debt Equity ratio of 1.5:1.

Assumptions:

Long-term foreign loans carry an interest rate of 10.0% per annum; Medium-term loans carry an interest rate of 11.5% per annum; and Short-term loans and overdraft for Working Capital carry an interest rate of 10%.

	LOCAL SOURCES (US$ '000)	FOREIGN SOURCES (US$ '000)	T O T A L (US$ '000)
Equity	7,805	11,505	19,310
Long-Term Loans	-	23,400	23,400
Medium-Term Loans	3,000	-	3,000
Short-Term Loans, Overdrafts	3,430	-	3,430
T O T A L	14,235	34,905	49,140

2.3. Information on Profitability and Return on Investment:

Assuming a 'net book' FOB value of US$4,110 per tonne ;

- Internal Rate of Return is 25.3%
- Payback period is about 4.4 years
- Break-even capacity is approximately 50%
- Average annual foreign exchange savings is US$13,470,000 per year.

3. Foreign Contribution Desired:

Equity participation and loans are required. The joint-venture agreement will incorporate management, training and technical assistance agreements.

4. Project Study Available:

Pre-feaseibility and market studies are available.

C. GENERAL REMARKS

The pre-feasibility study has shown that the engineering industry will be the largest consumer of copper products (mainly bare conductors used in making electric motor, transformers, resistors, and rewinding and repairing electrical equipment). The project is very important in the sub-region (and to Zambia) in that it will :

(1) utilise available local resources;

(2) accelerate capital formation;

(3) promote the production of essential components, parts and equipment that are currently being imported;

(4) save foreign exchange; and

(5) result in considerable transfer of technology in the sub-region.

The project is an important component in the electricification and telecommunications programmes for the sub-region.