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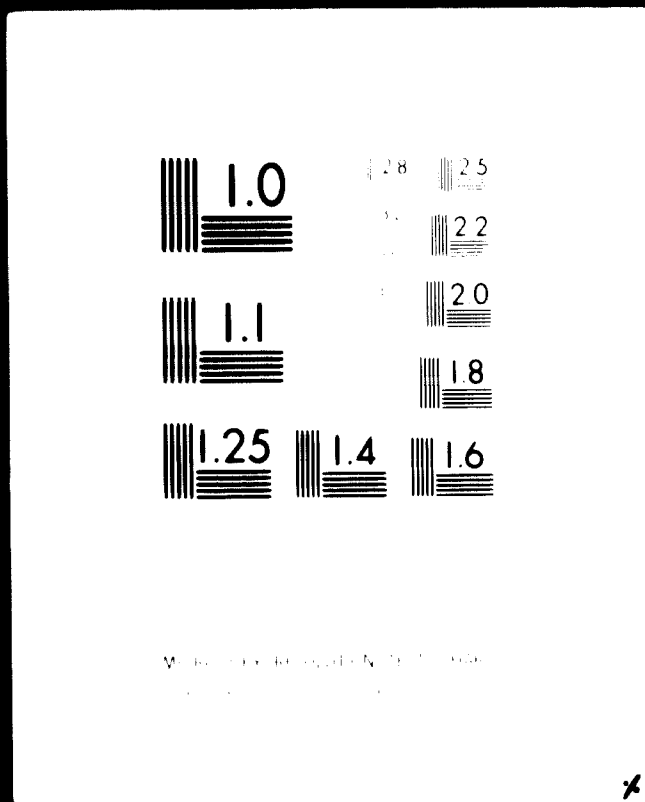
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INVENTORY OF FEASIBILITY STUDIES *

VOLUME I

(Serial Numbers 1 to 53)

060085

Prepared by
Feasibility Studies Section
Industrial Operations Division

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Inventory of feasibility Studies

003302

Country : Togo (TOG)

Industrial Sector : Food Industry (31.7.C)

Serial Number : 1

Classification: 77/1/01/TOG/31.7.C/F/Soluble coffee

Title of study: Usine de café soluble au Togo - Etude de Faisabilité
(IS/TOG/71/806, UNIDO document UNIDO/TCD. 217)

Date of study : 24-7-1973

Author of study : N. Demsic

Sponsoring agency : UNIDO, Government

1. Description

The study analyses the possibility of establishing a factory producing soluble coffee with a capacity of 900 t/y. Raw materials are locally available and the study suggests to process the following varieties in the factory :

- (i) Arabusta and/or Arabica (25 to 40%)
- (ii) Robusta Niaouli and/or new variety of robusta (50 to 70%)
- (iii) Broken and undamaged grains from previous harvest (15 to 20%)

Total investment costs excluding working capital would amount to F CFA 578,100,000; the latter was calculated to be about F CFA 123,774,000 assuming an operational cycle in which working capital recirculates of four months. The break even point would be at 450 tons per year i.e. at about 50% of initial capacity of 900 t/y.

2. Recommendations

- The soluble coffee should be produced by atomization.
- Before implementing the project, a further market study would be needed.
- The concurrence on soluble coffee markets is very tough; therefore a foreign investment participation should be assured.
- The export of soluble coffee should be organized with the co-operation or association of big companies which can guarantee stable sales of the product.
- The factory should not be built until sufficient sales in Togo and in the surrounding countries are guaranteed. Therefore the possibility of co-operation with other soluble coffee factories is advisable.

3. Financial returns

Net annual sales would amount to F CFA 575,100,000, annual production costs would be F CFA 460,583,530 and net profit after tax would be F CFA 72,144,346. The internal rate of return would then be 12%. The sensitivity analysis shows that by a reduction of 10% of the selling prices, the internal rate of return would drop to 8.0% and that an increase by 10% of the investment costs would lower the internal rate of return to 11.8%.

4. Economical benefits

- The export of soluble coffee will bring annual entries of about F CFA 749,700,000 gross. These entries will come mainly from countries with which Togo shows now a negative trade balance.
- Creation of new labour employment and thus creation of additional income will be another socio-economical benefit.

5. Follow up action:

- Letter Haneck/Res.Rep. dated 24-7-1973 : Three additional studies should be needed, i.e.
 - (a) study of actual and future possibilities for the factory in procuring of robusta and/or arabica, and of prices
 - (b) marketing study for soluble coffee based on samples of product.
 - (c) Techno-economic feasibility study based essentially on preliminary study of Mr. Demsic but incorporating data given by (b) and (c).
- Letter Res.Rep./Houzer, UNCTAD dated 20-1-1975 : Report of Mr. Demsic was transmitted to government in June 1974. Up to now (i.e. 20-1-1975) the Res. Rep. has received no comments of the government on it.
- Telephone conversation with Mr. Manning, Light Industries Section dated 28-9-1977 : As per Mr. Manning no other follow up action was done since.

Inventory of feasibility studies

003301

Country : Burundi (BDI)

Industrial Sector : Leather and Leather products industry (31.7.D)

Serial Number : 2

Classification: 77/2/01/BDI/31.7.D/P

Title of study: Etude de préfactibilité d'implémentation d'une tannerie de cuir de bovins, de peaux d'ovins et caprins en République Burundi

Date of study : November 1975

Author of study : M. Milutin Djonovic

Sponsoring agency: UNIDO, Government

1. Description

Burundi has exported 994 tons of dry hides and skins during the year 1974. This study analyses the possibility of processing these hides and skins in the country. The study analyzes the possibility of the establishment of a tannery processing cattle hides and sheep and goat skins mainly for exports. Until 1975 only the dry hides and skins were exported. The suggested tannery would reach full capacity in the third year of production, processing then 60,000 cattle hides, 60,000 sheep skins and 300,000 goat skins per year to produce finished leather, WET BLUE, non-pigmented and pigmented skins. The total investment costs of the project would be 207.2 million FBu including working capital in third year of 46 million FBu. The break even point of the tannery would be at 49%.

2. Recommendations

- Fellowship training in Europe is needed as there is a lack of technical skill in the country.
- Special attention should be given to a good quality of the products.
- The project should be tax privileged.
- Having until now no experience and no technically skilled labour in production of leather, the possibility must be analysed to furnish local raw materials like chemical products to the tannery as these products are imported at 100% until now.
- Aid should be requested from UNDP, UNIDO, ILO or other international organizations in the field of management, production and commercialization.

3. Financial returns

Annual sales revenues at full production will be FBu 138,351,000, the corresponding production costs will be FBu 112,734,950 and annual net benefit will be FBu 22,849,050. The discounted rate of return will be 23% and the rate of return on investment will be 17%.

4. Economical benefits

- The project would create 96 new employment creating an additional income of FBu 6,003,000.
- The project would induce a value added of FBu 51,998,000.
- The new tannery would have a positive impact on the balance of payments of the country by generating net savings in foreign currency in the amount of 51,998,000 FBu.
- The new project would bring other socio-economical advantages by training and specializing labour in this industrial branch.

5. Follow up action

- Study completed. Agreement creating the company (Tannery du Burundi) and defining the modalities of participation (initial subscription 25 million FBu) of the different groups was signed in September 1976.
- 4-5-1977 : Managing Director and Chief Tannery Technician have already been recruited and the recruitment of the other technician is underway.
- Equipment selected (UNIDO project RP/BDI/76/004) and delivered in May 1977.
- Installation of equipment is being done (second phase of RP/BDI/76/004)
- Three fellows to be sent to France for training. Project not yet approved (Memo to Ahmed/Vassiliev dated 21-6-1977) and fellows not yet selected.

Inventory of Feasibility Studies

Country : Senegal (SEN)

00300

Industrial Sector : Light non-ferrous metals (31.8A)

Serial Number : 3

Classification: 77/3/01/SEN/31.8.A/F/Ilmenite sands

Title of study: Etude de faisabilité technico-économique pour le traitement des sables d'ilménite (VC/SEN/72/006)

Date of study : May 1976

Author of study : "Tsvetmetpromexport", Moscow, USSR

Sponsoring agency : UNIDO, Government

1. Description

The study investigates the possibility for construction of a plant to extract and process "black sands" containing ilmenite, rutile and zircon. Three alternatives of ore dressing and two alternatives of melting of ilmenite concentrates are considered.

As for the ore dressing, alternative one foresees the treatment of 750,000 t/y of sand giving 55,000 t/y of ilmenite concentrate, 2,400 t/y of rutile concentrate and 7,350 t/y of zircon concentrate. The investment costs would then be F CFA 2958.2 million, excluding working capital. Alternative two foresees the treatment of 1,500,000 t/y of sand giving 110,000 t/y of ilmenite concentrate, 4800 t/y of rutile concentrate and 14,700 t/y of zircon concentrate. The investment costs excluding working capital would then be F CFA 3,983.3 million. Alternative three foresees the treatment of 3,000,000 t/y of sand giving 220,000 t/y of ilmenite concentrate, 9600 t/y of rutile concentrate and 29,400 t/y of zircon concentrate.

As for the melting of ilmenite concentrates, alternative one foresees three furnaces of 5 MVA of an annual capacity of 33,450 to 36,000 tons of ores and a quantity of concentrated ilmenite treated of 58,100 to 59,540 t/y. The investment costs including working capital would then be F CFA 4,358 million. Alternative two foresees three furnaces of 10.5 MVA of an annual capacity of 66,450 to 76,200 tons of ores and a quantity of concentrated ilmenite treated of 117,700 to 122,600 t/y. The investment costs including working capital would then be F CFA 6618 million.

2. Recommendations

- Before implementing the project, mineral prospection should be followed up and identified.
- A detailed study of the factory should be made.
- Geological and hydrological prospections would be necessary before starting the detailed study of the factory.
- In case of melting of ilmenite concentrates, the profitability depends highly upon the price of electrical energy.

3. Financial returns

The ore dressing process, alternative one would bring an annual sales income of F CFA 903.5 million, annual production costs of F CFA 1050 million and an annual loss of F CFA 146.5 million. Alternative two would bring an annual sales income of F CFA 1807 million, annual production costs of F CFA 1480 million and an annual profit of F CFA 327 million.

Alternative three would bring an annual sales income of F CFA 3614 million, annual production costs of F CFA 2435 million and an annual profit of F CFA 1179 million.

As mentioned above, profitability of melting of ilmenite concentrates would heavily depend upon the price of electrical energy. There would be a zero profitability if electrical energy costs 3.4 F CFA per Kwh and the maximum profitability (profit of 6.4%) would be obtained when electrical energy costs nothing.

4. Economical benefits

- The project would create a substantial number of new labour employment possibilities inducing thus a considerable amount of additional income.
- Exports of ilmenite, rutile and zircon concentrates would bring an important amount of foreign currencies having thus a positive effect on the balance of payments of the country.

5. Follow up action

- 19-2-1975 : "World Market for Ilmenite, Rutile and Zircon - A study conducted for Senegal on behalf of UNIDO" by P. Muralidharan served as a preliminary basis.
- May 1976 : Feasibility study of Tsvetmetpromexport sent to UNIDO.
- Comments on feasibility study by Mr. Szakal, Metallurgical Industries Section dated 18-5-1976: The comments are not too encouraging. With new selling prices (Feb.76), the profits for the ore dressing would be the following (especially due to the fall of the zircon selling prices on the international market)

| I | II | III |
|-------------------------|------------------|------------------|
| Profit -472.4 to -466.1 | -324.8 to -232.3 | -124.4 to + 60.5 |

As for the melting of ilmenite concentrates, this does not seem economically feasible, due to the costs of electrical energy in Senegal (22 F CFA per Kwh.)

- Letter Correa da Silva, Metallurgical Industries Section SIDFA dated 28-10-1976 : Potential partners may be sought within Europe, in France, Italy and the Benelux countries.
- Letter Hervouet, SIDFA/Szakal dated 5-1-1977 : Government is in contact with an investor from USA to create a mixed society.
- Discussion with Mr. Szakal dated 28-9-1977 : The Government is still interested in the project and is trying to implement it on a bilateral basis. No help from UNIDO is requested at the time being. In case, the Government needs UNIDO's help, the Senegalese authorities will contact us.

Inventory of Feasibility Studies

Country: Central African Empire (CAF)

003306

Industrial Sector : Heavy clay, ceramics, glass and allied products
Industry (32.1.B)

Serial Number : 4

Classification: 77/4/01/CAF/32.1.B/P/Ceramics

Title of study : Création d'une usine de produits céramiques en République
Centrafricaine - Etude de Faisabilité (IS/CAF/73/002)
UNIDO Doc. UNIDO/IOD. 14

Date of study : 30 March 1976

Author of study : Pierre Etienne Bouchard

Sponsoring agency : UNIDO, Government

1. Description

There exist two brick factories in the Central African Empire name BRICERAM in the outskirts of Bangui and the brick factory of Boyali at 60 km from Bangui. The study analyses the possibility of establishing production of ceramics in one or both of above factories. Thus in the short term, production of red tiles could be set up in one of the two factories, the medium terms plan foresees the setting up of sand stone tiles production and in the long run production of earthenware (household and sanitary) will be started after having set up production of red tiles and sand stone tiles. Production of the Briceram factory has been 6950 tons in 1970 and the corresponding turn over was F CFA 45,000,000. The foreseen production was assumed to be 8000 to 10,000 t/y of hollow and solid bricks. The amount of the investment costs has not been worked out, it has only be mentioned that investment costs for materials would be reasonable.

2. Recommendations

- The Boyali factory is relatively modern but the Briceram factory works under bad conditions. Before starting a new production, urgent steps should be taken to bring the Briceram factory to a normal functioning.
- A study on quality, importance and exploitability of clay deposits should be initiated.
- On the spot training of electro-mechanical maintenance workers should be done.

3. Financial Returns

There are no calculations concerning sales revenues, production costs, profits, rates of return in the study. The only financial data were figures from 1969 and 1970 for the Briceram factory as follows :

Capital : F CFA 42,000,000

| (in 1000 F CFA) | <u>1969</u> | <u>1970</u> |
|------------------------|-------------|-------------|
| Fixed assets | 73,279 | 69,839 |
| Losses carried forward | 30,182 | 40,642 |

| | <u>1969</u> | <u>1970</u> |
|---------------------------------|-------------|-------------|
| Social capital | 41,950 - | 41,950 |
| Liabilities : Long term | 66,415 | 60,000 |
| Medium term | 10,791 | 10,000 |
| Short term | 7,431 | 25,108 |
| Production sales | 34,070 | 44,410 |
| Direct costs | 26,331 | 29,917 |
| Gross margin | 7,739 | 14,493 |
| Indirect costs | 17,334 | 15,365 |
| Benefit | - 9,595 | - 872 |
| Gross financing on own expenses | 12,431 | 10,700 |

4. Economical benefits

- The project would use mainly local raw materials
- The project would create new labour employment possibilities and inducing thus additional income.
- The use of baked earth materials for housing has advantages in the local warm and wet climate and will permit important savings of cement. The activity of house building is in a way induced by local availability of ceramic products.

5. Follow up action

- 24-7-1976 : Draft project proposal "Production de briques et de carreaux céramiques en République Centrafricaine : \$ 350,000
- Letter Government/Res.Rep. dt. 12-6-1976 : The Government is interested in the construction of a ceramic products factory.
- Letter SIDFA/Velky dated 3-11-1976: The study is too uncomplete to be used as a basis for the promotion of a foreign investment. The following elements should be numerically studied :
 - Availability of raw materials
 - Size of the market
 - Target production, size and projected cost of equipment
 - Total investment
 - Provisional balance sheets and profit and loss statements.
 - Projected internal rate of return.

This could be done by a UNIDO expert, perhaps in 1977, on the basis of a nine months SIS financed mission.

- Discussion with Mr. Biering, Chemical Industries Section dated 27-9-77 : No other follow up action has been taken since.

Inventory of Feasibility Studies

003307

Country : Peoples' Republic of Congo (PRC)

Industrial Sector : Basic chemicals Industry (32.1.C)

Serial Number : 5

Classification : 77/5/01/PRC/32.1.C/F/Salt

Title of study : A study of the feasibility of a factory for extracting sodium chloride from potassium chloride residues

Date of study : January 1973

Author of study: M. Bes (PEC-Engineering, Paris)

Sponsoring agency : UNIDO, Government

1. Description

The study analyzes the possibility of establishing a factory for salt extracting having a capacity of 20,000 t/y. This unit could supply the Congo, the Central African Empire and the Chad Republic. This factory could be operated under good conditions of profit earnings. The investment costs of a 20,000 t/y unit would be F CFA 390,464 excluding working capital which was estimated to be F CFA 39,046,455.

2. Recommendations

An analysis of the African salt market suggests :

- that a 20000 tons per year capacity unit intended for supplying the Congo, the Central African Empire and the Chad Republic with NaCl could be operated under good conditions of profit earning.
- that a unit intended for supplying this market with NaCl and for exporting it would not be competitive.

3. Financial returns

The selling price of the salt has to be worked out according to the following formula :

Selling price = $1.45 Y + FE$ (Fixed expenses) + FE (proportional expenses) + Profit.

Y is an unknown parameter i.e. the price of the residues of salt production, supplied and sold at a price to be fixed.

Two rates of profit have been mathematically worked out i.e. 3% and 5%.

At a rate of profit of 3%, profit would be F CFA 22,216,022 and at a rate of profit of 5%, profit would be F CFA 37,026,830, both profits assuming a production capacity of 20000 t/y of salt.

4. Economical benefits

- The project would use mainly local raw materials
- Another socio-economical impact of the project would be creation of new labour employment possibilities and thus creation of additional income.

- The exports to the Central African Empire and to the Chad Republic would increase the foreign currency reserves and would have a positive effect on the balance of payments of the country.

5. Follow up action

The UN document of the Economic Commission for Africa, Ref.No. IND-115/II 3-103 "Identification of chemical products with potential for integrated development in the UDEAC countries" states on page 6 para 27 : "In the light of further potentialities for salt outlets indicated in the report it does not appear justified for UNIDO to go ahead with the 20000 tons project entitled "Assistance à l'établissement d'une usine pour l'extraction du chlorure de sodium à partir des résidus de potasse" formulated in March 1974."

Inventory of Feasibility Studies

003303

Country : Algeria (ALG)

Industrial Sector : Fertilizers (32.1.F)

See also : Petrochemicals 32.1.H, Serial Numbers 6b and 6c

Serial Number : 6a

Classification: 77/6a/01/ALG/32.1.F/P

Title of study: Industrial and Marketing Surveys on petroleum derivatives and natural gas (DP/ALG/65/505) (Doc. id-69-3786, ITD 20)

Date of study : 16 July 1969

Author of study : UNIDO acting as participating and executing agency for UNDP (sub-contract No.73/67) Japan Cas-Line Co. Ltd., Tokyo, Japan.

Sponsoring agency : UNIDO, Government, Centre for Industrial Studies for the Maghreb

1. Description

The study analyzes the possibilities of establishing a fertilizer complex producing Triple Superphosphate (TSP), Diammonium phosphate (DAP), NP (20:20) Fertilizer and Calcium Ammonium Nitrate (CAN) and Phosphoric acid. Production of NP and CAN fertilizers were not recommended by the study. The production capacity was assumed to be 300 t/d of phosphoric acid, 180,000 t/y of DAP and 220,000 t/y of TSP, annual production was considered to be 86,000 t/y of Phosphoric acid, 110,000 t/y of DAP and 90,000 t/y of TSP. Total investment costs excluding working capital of the fertilizer complex would be US\$ 26,741,100 of which US\$ 16,483,000 would be needed in foreign currencies and DA 50,265,000 in local currency.

2. Recommendations

It is recommended to base the fertilizer complex on the production of TSP and DAP and to exclude NP fertilizers and CAN because :

- (a) the international markets for NP and CAN are limited;
- (b) compared to DAP, the transport costs of NP fertilizers per unit of nutrient are high and the range of its application is narrow;
- (c) CAN production would inevitably compete with the ammonium nitrate scheduled to be produced at the Arzew complex.

3. Financial returns

Total annual sales revenues would be US\$ 16,164,000 from which US\$ 9,618,000 would come from domestic sales and US\$ 6,546,000 from exports. The annual production costs would be US\$ 13,597,000.

Under the assumption of a 10 years economic life of the project, 300 days blocked operation per year and payments of 50% corporate tax during the whole economic life of the project, the rate of return on investment would be 14.9%. Under the assumption of a 10 years economic life of the project, 300 days blocked operation, no payments of corporate tax for the first three years and payments of 50% corporate tax for the rest of the life of the project, the rate of return on investment would be 17.6%.

4. Economical benefits

- The project would create an important number of new employment possibilities and thus generate a considerable amount of additional income.
- The project would have an import substituting effect and would also bring considerable amounts of foreign currencies resulting from exports. This would have altogether a positive effect on the balance of payments of the country.

5. Follow up action

- Memo Verghese, Chemical Industries Section/Doss, Information Service dated 12-10-1971 : A 560,000 t/y compound fertilizer plant is under erection in Annaba using ammonia produced in Arzew and phosphate rock from Djebel Onkh. This investment is along the lines proposed by UNIDO. The main contractors in this case was the French engineering company Krebs with know-how supplied by Ugine-Kuhlmann and P echiney-Saint Gobain/Union Chimique Belge.

Inventory of Feasibility Studies

003309

Country : Algeria (ALG)

Industrial Sector : Petrochemicals (32.1.H)

See also : Fertilizers (32.1.F) and Petrochemicals, natural-gas, serial numbers 6a and 6c

Serial Number : 6b

Classification: 77/6b/01/ALG/32.1.H/P

Title of study: Industrial and marketing surveys on petroleum derivatives and natural gas (DP/ALG/65/505) (Doc. id-69-3786, ITD-20)

Date of study : 16 July 1969

Author of study : UNIDO acting as participating and executing agency for UNDP (sub-contract No.132/66) : Japan Gasoline Co.Ltd. Tokyo, Japan.

Sponsoring agency: UNIDO, Government, Centre for Industrial Studies for the Maghreb.

1. Description

The study analyzes the establishing of a petrochemical complex producing ethylene, vinyl chloride, polyvinyl chloride (PVC), high density polyethylene (HDPE), polypropylene (PP) and low density polyethylene (LDPE). Three alternatives have been worked out. Alternative A produces PVC, LDPE and HDPE, alternative B produces LDPE and HDPE and alternative C produces LDPE and PP. For all the three alternatives, ethylene capacity would be the same i.e. 150,000 t/y. In each of the three cases it was proposed to produce plastomers, detergent base material, dodecyl benzene and aromatics. The process units foreseen in each case were :

- (1) Fractionation of condensate for preparing a naphta cut.
- (2) Steam pyrolysis of naphta for ethylene production
- (3) Production of plastomers
- (4) Aromatics recovery
- (5) Sodium chloride electrolysis.

The investment costs would amount to US\$ 90,250,000 of which US\$ 56,290,000 would be needed in foreign currencies and DA 166,406,000 in local currency. The economic life of the project was assumed to be ten years.

2. Recommendations

- Statistical analysis of world market situation and spot checks in the EEC, EFTA and COMECON regions confirm that there are good chances for the export of a wide range of basic and intermediate petrochemical products provided these are competitive pricewise.
- Calculations have confirmed that it is advisable to base the petrochemical complex on ethylene rather than acetylene.
- A survey of the following prospective industrial areas has shown the following order of preference : 1. Bedjaia 2. Arzew 3. Skikda 4. Annaba.

- Priorities should be given to plants for the fractionation of condensate, the production of ethylene, vinyl chloride, polyvinyl chloride (PVC), and high density polyethylene (HDPE). The production of low density polyethylene (LDPE), aromatics and dodecylbenzene should be deterred for one or two years.

3. Financial returns

At 100% operating efficiency, annual sales revenues would be US\$ 42,995,000 and annual production costs would amount to US\$ 33,751,000. Assuming an 80% operating efficiency, annual sales revenues would be US\$ 34,396,000 and annual production costs would amount to US\$ 31,141,000. Four rates of return on investment have been worked out :

- Assuming payments of 50% of corporate tax for the whole economic life of of project and an operating efficiency of 100%, the rate of return on investment would be 14.5%.
- Assuming no payments of corporate tax in the first three years, payments of 50% of corporate tax for the rest of the economic life of the project and an operating efficiency of 100%, the rate of return on investment would be 17.6%.
- Assuming payments of 50% of corporate tax for the whole economic life of the project, 80% of operating efficiency for the first two years and 100% operating efficiency for the rest of the economic life of the project, the rate of return on investment would be 13.3%.
- Assuming no payments of corporate tax for the first three years, payments of 50% corporate tax for the rest of the economic life of the project, 80% operating efficiency for the first two years and 100% operating efficiency for the rest of the economic life of the project, the rate of return on investment would be 14.7%.

4. Economical benefits

- The project would create an important number of new employments generating thus a considerable amount of additional income.
- The project would have an import substituting effect and would also bring considerable amounts of foreign currencies resulting from exports. This would have altogether a positive effect on the balance of payments of the country.

5. Follow up actions:

Memo Verghese, Chemical Industries Section/Doss, Information Service dated 12-10-1971 : The memo refers to an article of the Austrian newspaper "Kurier" which states that Japanese firms are undertaking the erection of a petro-chemical plant in Algeria with an initial capacity of 200,000 t/y of plastics. The memo states that "this development is a direct outcome of the SF project ALG-5 "Industrial and Marketing Surveys on Petroleum Derivatives and Natural gas" which started in August 1965 and was closed out on schedule in February 1968".

Inventory of Feasibility Studies

003310

Country : Algeria (ALG)

Industrial Sector : Petrochemicals (32.1.H) Natural gas

see also : Fertilizers (32.1.F) and Petrochemicals general, serial numbers 6a and 6b

Serial Number : 6c

Classification: 77/6c/01/ALG/32.1.H/P/Natural Gas

Title of study: Study of Markets of Algerian Natural Gas and the Technology of its transport (summary of the above study in "Industrial and marketing surveys on petroleum derivatives and natural gas" (DP/ALG/65/505) (doc. id-69-3786, ITD-20)

Date of study : 1969

Author of study : United Nations (Natural Resources Division) (see contract No.60/66, Scandia-Consult AB of Sweden and the Bureau Central d'Etudes pour les Equipments d'Outre-Mer (BCEOM) France.

Sponsoring Agency : UN(Natural Resources Division), Government, Centre of Industrial Studies for the Maghreb.

1. Description

The study analyzes the demand for natural gas on the European market and the different transport possibilities of natural gas such as transport by ~~land~~ over land pipelines and sea transport.

Of all the different systems, the overland pipelines with the trans-Mediterranean link provided by sea transport of liquid natural gas (LNG) is found to be the best feasible system. Though not as economically feasible perhaps as other systems, it would be more flexible and quicker to construct the LNG system since the technology has been proven.

Both methods of transport would be economically feasible unless a certain minimum throughput could be maintained.

Initially the LNG system should be designed to handle 3.5 Gm^3 per annum of natural gas and the submarine pipeline for 2 Gm^3 per annum.

As for the potential markets, the study mentions that there are promising prospects for the sale of Algerian gas in south-west Europe, principally Spain and Southern France.

2. Recommendations

- Algerian authorities would have interest to conclude an agreement in principle with France for delivery of liquid natural gas at a rate of 3.5 Gm^3 per annum by about 1975.
- Algerian gas can be offered at a competitive price on the Spanish market if the supply is submitted by submarine pipeline between Mostaganem and Cartagena, and if the amount purchased by Spain reaches some 1.8 Gm^3 per annum.

- Should it not be possible to finalize in the near future the agreement in principle between Algeria and France on deliveries of liquid natural gas, the Algerian Government would be well advised to abandon any kind of liquifaction scheme and to concentrate its efforts on export by pipeline.
- Efforts to make contacts with countries other than France and Spain should be made. Liquified natural gas to be shipped in methane tanker should be offered to Italy and Yugoslavia for delivery during 1970-75. Such deliveries could start as soon as the pipeline systems reach the Rhone Valley in France.

3. Financial returns

No indications in the summary of the "Study of Markets for Algerian Natural Gas and the Technology of its Transport".

4. Economical benefits

- The project would create an important number of new employments generating thus a considerable amount of additional income.
- The project would yield a considerable amount of foreign currencies resulting from exports. This would have a positive effect on the balance of payments of the country.

5. Follow up action

- Discussion with Mr. Maung, Chemical Industries Section dated 29-9-1977 : Project has been implemented. Ref. International Petroleum Encyclopedia 1976.
- International Petroleum Encyclopedia 1976 page 112 : "Natural gas production, nearly all of it used for liquified natural gas (LNG) exports, currently averages about 700 MM cfd."

Inventory of Feasibility Studies

003311

Country : Senegal (SEN)

Industrial Sector : Basic Chemicals Industry (32.1.C)

Serial Number : 7

Classification: 77/7/01/SEN/32.1.C/P/Solar Salt

Title of study: Study for potential 50,000 tons/year solar salt production complex (DP/SEN/70/514)

Date of study : 10 November 1972

Author of study : S.T.I. (Studio Technico Ingegneria, Rome, Italy)

Sponsoring agency : UNDIO, Government

1. Description:

The study determines three areas for possible solar salt production namely: (1) area near Kayar, in the north of Dakar, (2) area near Isal, (3) area near Fatik.

Area 1 has exceptional value concerning the geographic and topographic conditions while its meteorological conditions compared to areas 2 and 3 are less good. In the study area 1 is examined as altogether it presents the optimal characteristics in order to have a basis for a future study. The production of 50,000 tons/year of solar salt would require an investment of 238,000,000 F CFA.

2. Recommendations:

- The definite choice of the area where production of solar salt should be located will only be possible after a specific and detailed study of the various zones.
- The production of 50,000 t/y is of small importance as far as export and industrialization use of salt are concerned. A higher production level would require an indepth research of the market absorption of the product in such a way as to give clear directions concerning the optimal potential of the saltern itself.
- As there are great differences in costs between refined and unrefined salt, it is necessary to introduce salt conditioning in Senegal for their own consumption and for export.
- Due to scarce thickness of the crust and due to the not great production a semi-mechanical gathering is advisable.

3. Financial returns:

The annual production costs would be 76,490,672 F CFA. No indications of sales revenues, profit and of the internal rate of return are given in the study.

4. Economical benefits:

Import-substitution by processing local raw materials, resulting in a positive effect on the country's balance of payments and an additional labour employment would be the most important economical benefits induced by the project.

5. Follow up action:

- Memo Chiang/Maneck of 20-2-1973 : S.T.I. report is found in general quite satisfactory.
 - Letter Maneck/Jaeger, Res.Rep. of 26-2-1973 : Report of S.T.I. and comments of UNIDO's technical department forwarded to Res.Rep.
 - Letter Jaeger/Maneck of 30-3-1973 : Res. Rep. pretends that report is unacceptable and that it cannot be presented to the Government.
 - Letter Tilot, SIDFA/Watson of 12-4-1973: Res. Rep. has forwarded report to UNDP headquarters.
 - Memo Watson/Maneck of 9-5-1973 : Report is substantively sound.
 - Letter Jaeger, UNDP/Maneck of 9-8-1973 : UNDP considers that the report is of average value.
 - Memo Oettinger/Becker-Boost of 6-8-1974 : The available study can not be taken as a complete evaluation and does not constitute a "feasibility Study".
- 14
- IBRD should be apprised of the existence of the report and that some one of IBRD or perhaps IFC should informally enquire in Senegal whether the matter is still active.
 - Draft project data sheet "Preparatory work of setting up a 50,000 tons/year solar salt plant" and a job description for a salt expert (1 month) prepared by Mr. Chiang on 18-3-1975. These drafts were sent from Watson to Maneck on 18-3-1975 to present them to the Government for consideration.
 - Discussion with Mr. Chiang, Chemical Industries Section on 3-10-1977 : Study was present to government but no reaction was received.
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Inventory of feasibility studies

003312

Country : Gambia (GAM)

Industrial Sector : Heavy clay, ceramics, glass and allied products industry
(32.1.B)

Serial Number : 8

Classification: 77/8/01/GAM/32.1.B/F/Ceramics

Title of study: Feasibility study for the commercial exploitation of
Kaolin deposits in Gambia (DP/GAM/72/004)

Date of study : 1974, Amendment 1 : 1975

Author of study: Institute for ceramics, refractories and raw materials
Horní Bržda, Czechoslovakia.

Sponsoring agency: UNIDO, Government

1. Description:

The Study considers two alternatives of ceramic production using the raw materials of Gambian Kaolin deposits. The first alternative is a pilot plant producing 10 t/y of wall tiles, 10 t/y of mosaics and 25 t/y of gift items. The pilot plant project would need investments of 392,000 Dalasis, including 30,000 Dalasis for working capital. The second alternative is an industrial plant producing 1000 t/y of wall tiles, 1000 t/y of mosaics and 50 t/y of gift items, needing an investment of 2,390,000 dalasis including a working capital of 326,000 dalasis. The gift items could be exported to neighbouring countries.

2. Recommendations:

- Ceramic production should be started by erection of a pilot plant as ceramic industrial plant is not recommended at present due to lack of markets.
- Large scale trials in a quantity of about 100 to 200m² or two tons per item (clay, seashells, quartz sands) should be done.
- A feasibility study for production of bricks and thinwalled brick products is suggested in Amendment 1 of the study.
- UNIDO should ensure the evaluation of reserves of local ceramic raw materials.
- The Government of Gambia should request UNIDO for technical, marketing and artistic assistance in the first years of production.
- The Government of Gambia should provide duty free import of machinery, imported materials and spare parts for the first six years of production. During this time, an exemption from profit tax should also be granted.

3. Financial returns:

The annual net sales revenues of the pilot plant would amount to 210,000 Dalasis, the annual production costs would be 129,000 Dalasis and the net annual profit would be 45,000 Dalasis. The internal rate of return would be 12.5%. The annual net sales revenues of the industrial plant would amount to 1,326,000 Dalasis, the annual production costs would be 783,000 Dalasis and the net annual profit would be 296,000 Dalasis. The internal rate of return would be 11%.

4. Economical benefits:

The import substitution and the exports of products of the pilot plant would have a positive effect on the balance of payments of the country of 147,000 Dalasis per year. As for the industrial plant, this positive balance of payments effect would be 1,067,000 Dalasis per year.

5. Follow up action:

- 1974 : Final report of feasibility study on ceramics.
- April 1975 : Amendment of feasibility study should provide feasibility study on large scale production of limed bricks (100,000 annually)
- 1975 : Amendment I of feasibility study done stating that raw materials for the production of building construction materials are abundantly available. It is recommended to carry out a feasibility study for production of bricks and thinwalled brick products.
- December 1975 : Project SI/GAM/75/818 "Establishment of a brick manufacture" approved by government - Expert in field, comes to Vienna October 1977.
- November 76 : Government is still interested in ceramic plant and is looking for investors.
- Information from Mr. Biering (27-9-1977) : The government of Gambia has shown great interest in the brick manufacturing project and therefore the SI/GAM/75/818 was initiated to send an expert to the field looking for possibilities to promote this industry. The expert comes to Vienna in October 1977.
- Discussion with Mr. Biering and the expert of SI/GAM/75/818 Mr. Sedalia on 5-10-1977 : The brick manufacturing plant is going to be set up.
- As far as the ceramic production plant is concerned, the government wishes first to finalise the brick manufacturing project before starting the other one.
- For the ceramic manufacturing plant it seems that the government would be interested to establish it later on a bilateral aid basis with China.

Inventory of Feasibility Studies

Country: Egypt (EGY)

003313

Industrial Sector : Light non-ferrous metals (31.8.A)

Serial Number : 9

Classification: 77/9/01/EGY/31.8.A/F/Ilmenite sands.

Title of study: Techno-economical feasibility report for constructing in ARE of an experimental plant for ilmenite ores concentration into commercial concentrates and electro metallurgical processing of ilmenite ores as concentrates into titanium dioxide rich slag and pig iron (VC/EGY/70/016)

Date of study: 1972

Author of study: TSVETMETROMEXPORT, Moscow

Sponsoring Agency: UNIDO, Government

1. Description: The study considers the possibility of constructing in Egypt an experimental plant for ilmenite ores concentration into commercial concentrates and electrometallurgical processing of ilmenite ores or concentrates into titanium slag and pig iron. Two versions for a pilot plant are considered : The first alternative is production of 29,330 t/y of calcinated ore and 13,900 t/y of titanium slag production at investment costs of 5,447,800 E.P. including 257,400 of working capital; the production is based on Abu Ghalga titaniferous ore deposits and on black sand deposits of the mediterranean sea coast. The second alternative foresees 8,700 t/y of titanium slag production from scrap pig iron and from converted pig iron at investment costs of 9,320,500 E.P. including working capital of 321,800 E.P. The pilot plant alternatives would not be economically feasible. Abu Ghalga deposits for use in open hearth furnace would be profitable if operated on a commercial scale. Capacity would then be 117,320 t/y calcination of ore and 55,600 t/y of titanium slag. This would need additional investment costs of 5,113,000 E.P. including 181,000 E.P. of working capital.
2. Recommendations:
 - The utilization of the Abu Ghalga ore deposit is promising from the point of view of processing it into titanium-bearing slag, but requires the development of the production procedures, namely oxidizing roasting, oxidized ore melting and high desulphurization of ore, slag testing facilities. Prospective evaluation of the effectivity of pig iron desulphurization stage shows that the upgrading of its quality to open-hearth or cast conversion pig iron requirements lowers the unprofitability of a pilot plant and provides for a satisfactory investment profitability for the Abu Ghalga operated full scale plant.
 - The construction of the Edfu pilot plant, alternative I could be expedient providing the confirmation of parameters and processes, set in a prospective evaluation of a full scale plant which requires to perform research work in view to develop above mentioned production procedures.
3. Financial returns:

Version I of pilot plant would suffer an annual loss of 210,000 E.P.

Version II an annual loss of 1,436,000 E.P.

The commercial scale operation would bring annual sales revenues of 3,050,000 E.P., annual production costs of 1,897,000 E.P. and an annual profit of 671,000 E.P. The internal rate of return of the commercial scale operation would be 11.1%.

4. Economical benefits:

The use of local deposits to produce titanium slag would certainly have an import substitution effect and a positive impact on the country's balance of payments. Labour employment would be another positive effect on national economy.

5. Follow up action:

- Feasibility submitted to government in November 1972.
- Follow up discussion in Cairo on 22-11-1972: For Abu Ghalga Ilmenite ore deposit, after and in case of successful accomplishment of additional laboratory and industrial scale testing and after trial runs, the design work of establishing industrial scale electro-metallurgical production of titanium slag in Egypt, based on this deposit, may be started.
- On 9-11-1972, the "Report on Market Survey for high-titania slag proposed to be produced by the Arab Republic of Egypt" by P.Muralidharan (Doc UNIDO/TCD 144, Project No.IS/EGY/71/814) was published.
- Draft project document DP/EGY/71/814 for an establishment of a pilot scale prototype plant for electro-smelting of ilmenite was prepared for a duration of 3 years with a UN budget of \$ 250,000 and including the following work plan : Start 1-10-1973; Commissioning and start up 1-1-76. Experimental operation 1-3-1976.
- Cable 20750 Maneck/Linner, UNDEPRO Cairo dated 6-11-1973 : "Appreciate receiving governments reaction".
- Discussion with Mr. Szakal on 5-10-1977 : As per Mr. Szakal, no further follow up action was taken since.

Inventory of Feasibility Studies

Country: Senegal (SEN)

Industrial Sector: Textile industry (31.7.B)

Serial Number: 10

Classification: 77/10/01/SEN/31.7.B/P/Surgical bandages

Title of project: Projet de fabrication d'objets de pansement - Technologie, Marche, Coût et rentabilité (DP/SEN/70/514)

Date of study: June 1971

Author of study: Amadou Wade, SONEPI

Sponsoring agency: SONEPI, Government (UNIDO : Industrial Information Section provided help in research and investigations)

- 003314
1. Description: The study worked out two alternatives. The "optimistic" alternative foresees production of 100 t/y of cotton, 900,000 units/y of towels and 800,000 meters/y of bandages. The "pessimistic" alternative foresees production of 120 t/y of cotton, 1,500,000 units/y of towels and 1,000,000 meters/y of bandages. Investment costs for the project would be F.CFA 67,000,000. In a first phase, a production unit should be centered on hydrophile cotton, on carded cotton and on glazed cotton with marginal activities i.e. production of bandages and sanitary towels. The second phase is planned for production of sterilized gauze compresses and in phase three production of adhesive bandages and sterilized gauze tissues should be started.
 2. Recommendations:
 - To evitate the permanent employment of a foreigner, UNIDO should be asked for a six months technical assistance under the control of SONEPI.
 - To attract foreign capital, an exemption of taxes on turnover for the first five years should be granted.
 - An exemption of benefit taxes should be granted during the period of reimbursement of complementary credits foreseen to finance investments.
 3. Financial returns:

For the optimistic alternative net profits of F CFA 6,322,000 could be expected. The annual return on fixed capital would be 20% in the fifth year. For the pessimistic alternative, the net profit would amount to F CFA 2,939,000. The annual return on fixed capital would be 9% in the fifth year.
 4. Economical benefits:
 - Raw materials could be locally provided.
 - The project would have an import substitution effect which would positively influence the country's balance of payments.
 5. Follow up actions:

Letter Léger, Res.Rep./Maneck dated 29 June 1972 : Official request for an expert to help in the start up of a surgical bandage and cotton wool factory.

Letter Minister of Industrial Development/Minister of Co-operation of 29-5-1972: Financing scheme has been established by SONEPI and a society

is being constituted. Capital and management will be Senegalase. But engineering study and start up needs presence of an expert.

Cable Quijano - Caballero Do-Kingue of 2-4-73 : Request for approval of financing 4 months cotton wool bandages manufacturing expert.

Memo de Moustier/Dietschy of 7-5-1973 : Res. Rep. is asking to keep recruitment of a cotton wool expert in abeyance as a Taiwan cotton wool bandages manufacturing company has shown some interest in the project and is now in Senegal. (Letter Res.Rep./L. Saunders of 7-4-73).

Project Data Sheet for project IS/SEN/75/013 signed in October 1975 for an expert in manufacturing surgical bandages to help chief of the enterprise in equipment reception and installation, organization of production and helping in the start up of operations.

Letter Ministry of Co-operation/Res.Rep. dated 12-1-1977 : Ministry will communicate approximative date of start up of the factory and period in which expert is needed.

Cable Hervouet SIDRA/de Souza de Liete of 7-2-77 : as one partner has withdrawn from the participation of the enterprise, the Development Bank (SOFIDEST) has withdrawn credit needed to buy material. This can postpone sine die the start up of the factory.

Letter SOFIDESIT/Hervouet of 30-8-1977 : Project was favourably evaluated by administrative committee of the Bank.

Discussion with Mr. Eraneva of 5-10-1977 : Project postponed and expert only expected to go in 1978.

Inventory of feasibility studies

Country: Algeria (ALG)

003315

Industrial sector: Petrochemicals (32.1.H)

Serial number: 11

Classification: 77/11/01/ALG/32.1.H/F/Polyurethane

Title of study: Techno-economical study for the establishment of a polyurethane foam production in Algeria (DP/ALG/72/005)

Date of study: April 1972

Author of study: Battelle Institute E.V. Frankfurt/Main, FRG

Sponsoring agency: UNIDO, Centre for Industrial Studies and Technology (C.E.I.T.)

I. Description: The study analyzes different possibilities of application of polyurethane foam such as flexible foam, moulded parts, shoes' soles and bicycles, construction elements.

Flexible foam production with a capacity of 4,000 t/y was foreseen at investment costs of DA 2,509,000 excluding working capital of DA 12,727,900. Moulded parts for shoe soles to be produced 500,000 pairs/year or 100 t/y at investment costs of DA 1,077,000, excluding working capital of DA 565,600. As for the construction elements a production of elements type "Hoesch Isowand" with an annual capacity of 240,000 m² or 580 t/y at investment costs of DA 9,700,000 excluding working capital of DA 3,509,700 was considered.

II. Recommendations: The existent flexible foam production is satisfying the demand in Algeria; there is even an overcapacity for the next years. Therefore other units producing soft foam should not be installed.

As for the semi-rigid and structured foams, moulded parts are suggested for the shoe and bicycle industry.

For rigid foam, it is recommended to produce sandwich panels and refrigerators' isolations.

The realized prices in Algeria can compete on international markets, especially concerning construction elements. It is therefore recommended to appreciate export chances and to develop an appropriate sales strategy.

III. Financial returns: Flexible foam production would bring annual sales revenues of DA 34,388,000, annual production costs of DA 26,362,800 and annual net profit of DA 1,368,200. The internal rate of return would be 20.3%.

Moulded shoes' soles would bring annual sales revenues of DA 1,626,100, annual production cost of DA 1,284,100 and annual net profits of DA 73,200. The internal rate of return would be 9%.

Construction element type "Hoesch Isowand" would bring annual sales revenues of DA 19,038,000, annual production costs of DA 14,595,000 and annual net profit of DA 1,129,000. The internal rate of return would be 9.4%.

IV. Economical benefits: As export possibilities especially for construction elements are good, the project would increase the income of foreign currencies. Other economical benefits would be import substitution and labour employment.

5. Follow up action

- Letter Ellass, Project Manager/Maneck dated 14-4-1972 : The study of Battelle is incomplete, too general and technically unacceptable to serve as a basis to elaborate conditions of contract, to buy equipment and to implement the project.
- Memo Glebor/Maneck dated 29-5-1972 : Most of the points raised by Mr. Ellass have been taken into account by the contractors in the final version of the study.
- Evaluation report 5 June 1972 : Minimum performance. Remark : Contractor is being requested to provide additional information in a separate volume.
- Letter Ellass/Maneck dated 11-7-1972 : Additional details provided by Battelle as acceptable.
- Letter Maneck/Ellass dated 28-7-1972 : "What is the outcome of the study".
No answer on this question in letter Ellass/Maneck dated 9-8-72.
- Letter Satrap, Officer in charge Bureau for Europe, Mediterranean and the Middle East/Quijano Caballero of 7-6-1974 : "We have noted the long list of studies which have been carried out under the auspices of the project It might be useful to determine what action the Government has taken or is taking to ensure a follow up to the studies by proceeding with the proposed investments".
- Final report DP/ALG/72/005 of 12-7-1974 : Project is included in list of projects to be implemented in period 1974-1980.
- Letter Quijano-Caballero/Makiedo dated 4-9-1974 : "As for the action the Government has taken or is taking to ensure a follow up to the recommendations contained in the different studies, we have no information on this subject. We hereby suggest that the question be raised when UNDP will officially submit this final report to the Algerian Government".
- Discussions with Mr. May and Mr. Maung, Chemical Industries Section, on 10-10-1977 : None of them knows what happened to the project.

Inventory of feasibility studies

003316

Country: Algeria (ALG)

Industrial sector: Petrochemical industries (32.1.H)

Serial number: 12

Classification: 77/12/01/ALG/32.1.H/P/ Vinyl Acetate

Title of study: Preliminary feasibility study of a vinyl acetate production unit (DP/ALG/72/005)

Date of study: August 1972

Author of study: National institute of productivity and industrial development (INPED)

Sponsoring agency: UNIDO Centre for Industrial Studies and Technology (C.E.I.T)

I. Description: The study analyzes the production of vinyl acetate with two alternative production capacities. The first alternative assumes a capacity of 4,500 t/y at investment costs of DA 9,100,000. The second alternative foresees a capacity of 13,500 t/y of vinyl acetate at investment costs of DA 13,650,000. Consumption forecasts for the year 1980 are 4,500 t/y. This market does not justify the installation of a vinyl acetate production unit in Algeria. The export markets of the product are very limited as the big capacities installed in Europe, Japan and the United States allow to produce at prices which are too low for small and middle scale units. The only exportation possibility would be the market of the Maghreb.

II. Recommendations: At present, the establishment of a vinyl acetate production unit is not recommended in Algeria.

A detailed technico-economical feasibility study is therefore not advisable for the time being.

If certain new factors arise on the Algerian or world market in the years following 1975, the study should be up-dated and may be come to new conclusions.

III. Financial returns: Production costs for a unit with a capacity of 4,500 t/y would be 1.00 DA/kg, production costs for a unit with a capacity of 13,500 t/y would be 0,74 DA/kg. The annual return on investment for both units would be 25 %.

IV. Economical benefits: As the production unit will not profit from economics of scale, the only benefits would be of a socio-economical nature, such as new labour employment possibilities.

V. Follow up action: Study is mentioned in the Final Report of project DP/ALG/72/005 prepared for the Algerian Government (UNIDO/TCD 331) dated 12/7/1974, but is not included in the list of projects to be implemented in the period 1974-1980 on page 79 of above mentioned report.

Inventory of Feasibility Studies

003317

Country: Algeria (ALG)
Industrial sector: Essential oils and pharmaceuticals (32.1.D.)
Serial number: 13
Classification: 77/13/01/ALG/32.1.D./F/Cosmetics
Title of study: Techno-economical feasibility study of a cosmetics industry in Algeria (DP/ALG/72/005)
Date of study: June 1972
Author of study: Chem. Systems International Inc., London, U.K.
Sponsoring agency: UNIDO, Centre for Industrial Studies and Technology (CEIT)

I. Description: The study has evaluated the production of the following items: tooth paste, shampoo, lac and alcohol based perfumes. Additional products have been technically evaluated such as deodorants, sun-tan lotion, insecticides (such as aerosols), shaving cream, talc, medicinal and luxury soaps, eye make up, face- hand- and skin-creams, lipsticks and bath foams. The most interesting products to start with would be tooth paste, shampoo and alcohol based perfumes; the lac market does not seem so interesting because of the relatively high costs of the raw materials. The study analyzes the cosmetic production independent on existing facilities. - The investment costs would then be 3,089,000 DA and the cosmetic production as extension of existing facilities - the investment costs would then be 1,130,000 DA. The second alternative seems to be the most feasible. Annual production of 250 t/y of tooth paste, 440 t/y of shampoos, 280 m³/y of alcoholic perfumes and 5 t/y of lacs were suggested.

II. Recommendations: The new entrepreneur in the cosmetics industry must attach special importance to a good publicity of his products; this would have also an important influence on the hygienic and health level in Algeria.

Later on new products could be included in the production process as the increase of the factory would only yield minor supplementary costs.

The factory should be situated near Algier at a place where there are already at least two "Société Nationale" factories which could be modified to include the necessary facilities.

A market study on filling of aerosol bombs in Algier should be done as this study could make appear further interesting possibilities.

III. Financial returns: a) Cosmetics production independent on existing facilities would bring net annual sales revenues as of DA 11,762,600 in the 5th year, annual production costs in the 5th year of DA 10,584,700 and a net annual profit of DA 1,177,900. The DCF rate would be 17 %, assuming tax reduction, and negative if not tax reduction was assumed.

b) A cosmetic production based on the extension of existing facilities would bring net annual rates revenues of DA 11,762,600 DA in the 5th year, annual production costs in the 5th year of DA 9,933,500 and a net annual profit of DA 965,600. The DCF rate would be 10 %.

IV. Economical benefits: The project will have an import substituting effect, as the manufactured products are to be sold on the Algerian market. A consequential saving on foreign currencies can be expected.

The project will create important external economics as bottles for perfumes, packing material, labels etc. can be bought in Algeria.

About 100 new jobs would be created generating a gross income in 1978/79 of DA 988,800.

V. Follow-up action: Letter Ellass, Project Manager/Maneck dated 23/3/1972: Algerian authorities want to enlarge existing study for 4 products to 10 products (only technical side) i.e. deodorants, sun-tan lotion, insecticides (as aerosols), shaving cream, talc, medicinal and luxury soaps, eye make-up, face, hand and skin cream, lipsticks, bath foam.

Committee on contracts of 4/5/1972: amendment of contract recommended.

Memo Watson/Maneck dated 4/8/1972: Report supported by substantive division and suggestion of a project to plan advertisements and a project to assist present Algerian producers to consider augmenting their production lines to include speciality products and to develop new lines for both the Algerian population and the Maghreb and to supply the tourist trade.

Letter Maneck/Res.Rep. dated 7/9/1972: Request to submit feasibility study to the Government.

Final report of project DP/ALG/72/005 prepared for the Algerian Government dated 12/7/1974 (UNIDO/TCD.331): project listed on page 79 of above report on the "list of projects to be implemented during 1974-1980". On page 23 list of production programme of additional products i.e. deodorants 15 t/y, insecticides 30 t/y, foam baths 100 t/y, "Sels de bain" 25 t/y, face, hand and skin creams 100 t/y, sun-tan lotion 20 t/y, Sun oil 20 t/y, shaving cream 50 t/y, lipsticks 2.5 t/y, mascara 2 t/y, eye-make up 4 t/y, eye-liner 1 t/y.

No other relevant information regarding the cosmetic project in the Registry file.

Discussion with Mrs. Tcheknavorian Asenbauer on 11/10/1977:
Mrs. Tcheknavorian Asenbauer has no information on this subject.

Inventory of Feasibility Studies

003318

Country: Algeria (ALG)
Industrial sector: Food industry (31.7.C)
Serial number: 14
Classification: 77/14/DI/ALG/ 31.7. C/F/OILS + FATS
Title of study: Techno-economical feasibility study of the oil and fats industry in Algeria (DP/ALG/72/005)
Date of study: January 1975
Author of study: L.H. Manderstan and Partners Limited, London
Sponsoring agency: UNIDO, Centre for Industrial Studies and Technology (CEIT)

I. Description: The study suggests to set up 3 multigrain complexes in Algier, East and West.

The Algier complex will consist of a trituration unit (investment costs 106,893,000 DA) producing oil cakes (75,000 t/y), shells (67,500 t/y) refined oils (75,000 t/y), hydrogenized oils (31,400 t/y) unrefined oil (78,700 t/y) and acid oil (600 t/y); a margarine unit (investment costs: 9,520,000 DA) producing 27,000 t/y of margarine and a soaps, fat acids and a glycerine unit (investment costs 55,335,000 DA) producing finished soap (66,000 t/y), semifinished soap (33,000 t/y), glycerine (8,100 t/y) and fatty acid (12,000 t/y).

The Western complex will consist of an oil mill (investment costs: 95,458,000 DA) producing oil cakes (50,000 t/y), shells (45,000 t/y), refined oils (50,000 t/y) and acid oil (2,000 t/y). x

The Eastern complex will consist of an oil mill (investment costs 164,952,000 DA) producing oil cakes (100,000 t/y), shells (90,000 t/y), refined oils (100,00 t/y), unrefined oils (26,200 t/y) and acid oil (3,000 t/y).

The world market demand for oils and fats increased by 3 % per year in the last decade. Therefore there shouldn't be any problems to export these products. On the other side the Algerian market demand will increase by far more (doubling of edible oil consumption by 1985).

II. Recommendation: The order of priority to set up the 3 multigrain complex should be Algier, East and West.

The West complex should be set up in one phase, the Algier and east complex in two phases.

The development of the oils ^{and} fats industry in Algeria should be centralized and a unified programme should be established. It should also be necessary, to insure an adequate infrastructure such as piers, roads and railway transport, electrical energy.

Algeria could provide half of its needs of oilseeds. It has to rely on increasing imports of grains and oils. It is therefore extremely important to guarantee the purchase of grains in the following years by commercial agreements with selected countries.

III. Financial returns:

| | | |
|------------|--|------|
| DCF rates: | a) Trituration Algiers | 0 % |
| | b) Oil mill East | 49 % |
| | c) Oil mill West | 53 % |
| | d) Margarine Algiers | 41 % |
| | e) Soaps, glycerine, Satty acids Algiers | 58 % |

(a) itself not profitable is interesting when incorporated to combined operation.

IV. Economical benefits:

At full production (year 11) the gross sales revenues of the 3 complexes would come to 2,100,477,000 DA compared to production costs of 1,809,113,000 DA. Gross profit would then be 291,364,000 DA.

The new complex would create 801 new jobs in 1978 and 942 in 1982.

V. Follow-up action:

Memo Mautner/Maneck dated 21/3/1974: First phase report: recommendation of light industries section to submit the report to the Government of Algeria.

Memo Miklovicz/Maneck dated 14/4/1975: Final 3 volume report: recommendation of light industries section to submit the final report to the Algerian Government, as the report had outlined a very practical and useful scheme for the development of Algeria's vegetable oils and fats, a detailed follow-up discussion should be arranged between representatives of the Government, the UNDP Resident Representative, the UNIDO Industrial Field Adviser and the contractor to come to firm decisions about action to follow.

Nothing relevant in the registry file since.

003319

Inventory of Feasibility Studies

Country: Algeria (ALG)
Industrial sector: Petrochemicals (32.1.H.)
Serial number: 15
Classification: 77/15/01/ALG/32.1.H./F/Plastics
Title of study: Techno-economical feasibility study of four plastic materials transformation units in Algeria. (DP/ALG/72/005)
Date of study: 1973
Author of study: ROMCONSULT (Romanian Consulting Institute)
Sponsoring agency: UNIDO, Centre for Industrial Studies and Technology (CEIT)

I. Description: The study analyzes the establishment of four transformation units of plastic - an extrusion unit for PVC profiles, a unit for polyester elements reinforced with glass fibre (PAV), a unit of styrenic and phenolic foam and a unit of plastic impregnated tissues.

For the extrusion of PVC profiles, 2 alternatives have been worked out the first one foresees an annual production of 3,300 t/y, investment costs would be DA 31,683,000. The second alternative foresees an annual production of 10,000 t/y; investment costs would be DA 54,424,000.

The unit for polyester elements reinforced with glass fibre would produce 5,000 t/y and would have investment costs of DA 13,760,000.

The unit for styrenic and phenolic foam would produce 1,200 t/y of styrenic foam and 1,000 t/y or 20,000 m³ /y of phenolic foam; investment costs would be DA 9,790,000. Finally the unit of plastic impregnated tissues would produce 3,400,000 m²/y and would have investment costs of DA 12,000,000.

The prices of raw materials and subsidiary products in Algeria are generally higher than average prices on the world market, which could negatively affect the production conditions of the new units.

II Recommendations: The study recommends the realization of these different units within the frame of the Algerian development plan of the plastics transformation industries..

Besides of the analyzed units, the study suggests the Algerian authorities considering the introduction of a plastifier production unit of an initial capacity of 10,000 t/y and a production unit of normal calcium carbonate treated superficially of an initial capacity of 3,500 t/y.

The study insists on training of technical labour, on the measures to be taken to introduce plastics utilization into the different possible fields such as construction, packaging, electrotechnical industries, mechanical industries, transport and agro-industries.

III. Financial returns: The unit of PVC profiles, alternative one would have DA 23,100,000 annual gross sales revenues, annual production costs of DA 13,150,000 and annual net profit of DA 3,011,000. Alternative two would show annual gross sales revenues of DA 70,000,000 annual production costs of DA 31,810,000 and annual net profit of DA 13,105,000. The unit of polyester elements reinforced with glass fibre would have annual gross sales revenues of DA 92,500,000, annual production costs of DA 21,875,000 and annual net profit of DA 27,450,000.

The unit of styrenic and phenolic foam would have annual gross sales of DA 11,600,000, annual production costs of DA 6,746,000 and annual net profit of DA 1,444,000. Finally the unit of plastic impregnated tissues would have annual gross sales of DA 43,350,000, annual production costs of DA 27,421,000 and annual net profit of DA 4,280,000.

IV. Economical benefit: The project would be heavily import substituting, having though a positive effect on the balance of payment of the country. Another important impact on the national economy would be the additional labour employment.

V. Follow-up action: Letter Maneck/Elass, Project Manager, dated 17/9/1973 submission of the comments of substantive division on final report of ROMCONSULT. Comments of substantive division are very positive. Full information is given on the technological processes, raw and auxiliary materials, consumption of raw materials and utilities, space requirements and economic efficiency. Each unit is presented in connexion with the possibility of having it later implemented through bilateral negotiations between Algerian authorities and equipment and raw material suppliers. Each of the four studies could easily lead to the elaboration of tender specifications.

Cable Resident Representative, UNDP/Maneck dated 10/12/1973: 25 sets of final report received in November.

Final report of project DP/ALG/72/005 prepared for the Government of Algeria, dated 12/7/1974 (UNIDO/TCD.331): on page 79 of above report the four units are included in the list of projects to be implemented during the period 1974 - 1980.

No other relevant information in the registry file on further follow-up actions.

Inventory of Feasibility Studies

Country: Benin (BEN)
Industrial sector: Food Industry (31.7.C)
Serial number: 16
Classification: 77/16/O1/BEN/31.7.C./P/Citrus
Title of study: Techno-economical feasibility study for the establishment of a modern factory for the treatment of citrus fruit in Dahomey. (SM/DAH/73/012)
Date of study: April - September 1974=
Author of study: IFAC (Institut français de recherches fruitières outre-mer)
Sponsoring agency: UNIDO, Government

I. Description: The study came to the conclusion that lime and grapefruits are the most suitable citrus fruits for the Benin.

As for grapefruit (Pomélo) the suggested capacity is 36,000 t/y of fruit treated giving 36 t/y of essential oils, 7,200 t/y of marmalade, 3,600 t/y of sulfated peels, 3,600 t/y of concentrated juice and 1,180 t/y of fodder. For lime the suggested capacity is 24,500 t/y of fruit treated giving 78.5 t/y of essential oils, 4,900 t/y of marmalade 2,450 t/y of sulfated peels, 1,788 t/y of concentrated juice and 808 t/y of fodder. The investment costs for the factory would amount to 808,949,000 Francs CFA. The break even point would be reached in year 9 of production, if fruit were bought at 5 F/kg, in year 10 of production, if fruit were bought at 7.5 F/kg and in year 11 of production, if fruit were bought at 10 F/kg.

II. Recommendations: As returns on invested capital can only be expected in the 7th or 8th year of production and are relatively low, a "mixed formula" of company (Government and private manufacturers) should be envisaged. Financing could be done by low credits of banks such as IBRD etc.

Preliminary studies concerning topography and irrigation should be done and a set up of a plantation project should be planned. It seems advisable to have linked the factory and the plantation in an agro-industrial complex.

Plantations should be established in view of bringing the "surest" product, i.e. concentrated juice of grapefruit.

Progressively lime plantations should be installed which rectify the production programme according to economical evolution of lime concentrate and essential oils of lime.

It would be necessary to build a dam to provide water for irrigation and to set up other infrastructural requirements.

III. Financial returns: The internal rate of return at a project life of 15 years would fall from 12.62 % if fruit are bought at 5 F/kg to 1.76 % if fruit are bought at 10 F/kg. The corresponding rates for a project life of 20 years would be 15.84 % and 4.94 %, for a project life of 25 years, 16.89 % and 7.15 %.

The internal rate of return without considering the buying price of fruit and for a project life of 15, 20 and 25 years would be 21.68 %, 23.75 % and 24.3 % respectively.

IV. Economical benefits: As most of the products are supposed to be exported, the project would have an important positive effect on the balance of payments of the country, especially as raw materials would be locally available.

V. Follow up action: Memorandum Miklovicz/ Mautner dated 17/12/1974:
Favourable evaluation of the study.

- Note for the file from Acogny dated 7/1/1975: Study should help to encourage a smaller factory in the south of the country; the IFAC study should be submitted to the Dahomean Bank for Development; UNIDO should be authorized to get in touch with IBERD to build the big factory in the northern part of Dahomey; UNIDO should look for foreign investors.
- 10/3/1975: Copies of study sent to Resident Representative.
- 11/3/1975: No more comments from substantive division: the study should be submitted to the Government with UNIDO's endorsement.
- 21/3/1975 Receipt acknowledge from Resident Representative.
- Letter Behrstock, UNDP/Maneck dated 6/8/1975: Government wants complementary studies to evaluate agricultural investments. These studies will concern primary soil and irrigation systems. This next phase of preinvestment studies are discussed between FAO in Dahomey and Rome.
- Letter Directeur Général du Ministère des Affaires Etrangères et de la Coopération/ Resident Representative dated 1976: Financing in negotiation with the Caisse Centrale de Coopération économique.
- Discussion with Mr. Acogny on 11/10/1977: Project not been followed up due to political reasons. Prudence in approaching the Benin authorities is recommended. UNIDO should just ask about the status of the project but not propose any new studies.
- Discussion with Mr. Moreira-Dias on 14/10/1977: on his mission to Yugoslavia Mr. Moreira-Dias had met officials from Benin who told him that the project will be financed by an Italian investor. Benin will approach UNIDO in the near future for help (new project document is being prepared). Mr. Moreira-Dias will inform us as soon as the new UNIDO project is in the pipe line.

Inventory of Feasibility Studies

Country: Algeria (ALG)

Industrial Sector: Cement and concrete products industry (32.1.A)
see also: Iron and steel (31.8.C.)

Serial Number: 17 a

Classification: 77/17a/01/ALG/32.1.A/F/Tubes and pipes

Title of study: Etude technico-économique du secteur des tubes et tuyaux en Algérie (DP/ALG/72/005)

Date of study: August 1973

Author of study: Sorès Inc, Montreal, Canada

Sponsoring agency: UNIDO, Centre for Industrial Studies and Technology (C.E.I.T.)

1. Description: The study analyses the existing capacities in the tubes and pipes industry in Algeria of plastic, concrete, iron and steel, lead pipes and suggests that additional production lines should be considered by the Algerian tubes and pipes development plan, taking into account the demand projections 1974 to 1985. The conclusion of the study is that only increased production of concrete and steel and iron pipes is advisable as for the plastic pipes, there is already an overcapacity and for other pipes (copper, lead,...), the demand is too low.

As for the cement and concrete tubes the following additional capacities are suggested: Preconstrained concrete tubes: 26,000 t/y, sheet iron-concrete tubes: 25,208 t/y, armed concrete tubes: 65,000 t/y and asbestos cement tubes: 23,000 t/y. Total investment costs including DA 6,552,250 of working capital would amount to \$ 9,756,125 in foreign currency and DA 25,445,250 in local currency. Total investment expressed in local currency would be DA 64,469,750.

2. Recommendations:

- The following existing units should be given up: Oued Rhiou (1974), Khemis El Kechna (1974), Chaabat El Leham (1976), El Hadjer (1976).
- A sectoral organism of standardization should be established. Adoption to already applied norms or to norms recommended by I.S.O. or other organizations should be stressed.
- Industrial accounting (cost accounting method) and necessary statistics should be developed.
- The set up of mechanisms, which guarantee regular delivery of equipment and raw material would be important.
- Accelerated training programmes should be established.

3. Financial returns:

- Annual gross sales revenues would amount to DA 55,670,848, annual production costs would amount to DA 45,752,836 and an annual gross profit of DA 9,918,604 could be expected.

4. Economical benefits

- The added value of produced prestrained concrete tubes would be 65 to 70 % of selling price, of sheet iron-concrete tubes 47 % of selling price, of asbestos cement tubes 65 % of selling price.
- Import substitution and employment creation would be other economical advantages.

5. Follow-up actions

- Memo Soltan/Maneck dated 20.8.1974: SORÈS Inc. should present a summary of their major findings and recommendations
- Letter Ellass/Maneck dated 23.9.1973 (in attached "Activités du projet de la période début février à fin juillet 1973"): Study has been sent to Société Nationale de Sidérurgie (SNS), Société des Matériaux de Construction (SNMC), SONATRACH and to ministry of Industry. Evaluation meeting of the study will be held in second part of September. Will communicate results of meeting in due time.
- Letter Sorès Inc./Newton dated 28.9.1973: Volume of "Summary and Conclusions" prepared.
- Letter Maneck/Makiedo, UNDP, dated 31.10.1973: Final report of Sorès submitted to government.
- Rapport final préparé pour le gouvernement Algérien (UNIDO/TCO 331), dated 12.7.1974: Project included in list of projects to be implemented during 1974 - 1980, page 79 of above report.
- Discussion with Mr. Anderson, ICIS (who has been in charge of the project) dated 13.10/1977: Mr. Anderson doesn't know whether the project has been implemented or not.

Inventory of Feasibility Studies

Country: Algeria (ALG)

003322

Industrial Sector: Iron and Steel (31.8.C)

see also : Cement and concrete products industry (32.1.A)

Serial number: 17b

Classification: 77/17b/01/ALG/31.8.C/F/Tubes and pipes

Title of study: Etude technico-économique du secteur des tubes et tuyaux en Algérie (DP/ALG/72/005)

Date of study: August 1973

Author of study: Sorès Inc., Montreal, Canada

Sponsoring agency: UNIDO, Centre for Industrial Studies and Technology (CEIT)

1. Description: The study analyses the existing capacities in the tubes and pipes industry in Algeria of plastic, concrete, iron and steel, lead pipes and suggests that additional production lines should be considered by the Algerian tubes and pipes development plan, taking into account the demand projections 1974 to 1985. The conclusion of the study is that only increased production of concrete and steel and iron pipes is advisable as for plastic pipes, there is already an overcapacity and for other pipes (copper, lead) the demand is too low.

As for the steel tubes two alternatives has been envisaged: The first alternative foresees a production of 11,000 t/y of W-20 P steel tubes in a first phase starting in 1975. Investment costs would amount to DA 25,480,000 including \$ 2,964,500 in foreign currency and including a working capital of DA 3,100,000. In the second phase starting in 1978 a production of 11,000 T/y of W-20P steel tubes and 45,000 t/y of W-35 steel tubes is foreseen. Additional investment costs would amount to DA 23,430,000 including \$ 1,760,000 in foreign currency and including a working capital of DA 12,000,000. The second alternative foresees a production of 16,000 t/y of W-20 P steel tubes in a first phase starting in 1975. Investment costs would amount to DA 25,480,000 including \$ 2,964,500 in foreign currency and including a working capital of DA 3,100,000. In the second phase starting in 1978, a production of 16,000 t/y of W-20 P steel tubes and 65,000 t/y of W-35 steel tubes is foreseen. Additional investment costs would amount to DA 23,430,000 including \$ 1,760,000 in foreign currency and including a working capital of DA 12,000,000.

As for the iron tubes, a production of 27,500 t/y of cast iron tubes should be planned at total investment cost of DA 34,433,000 including \$ 5,600,000 in foreign currency and including DA 5,883,000 of working capital.

2. Recommendations:

- The following existing units should be given up: Oued Rhiou (1974), Khemis El Kechona (1974), Chaabat El Leham (1976), El Hadjar (1976).
- A sectoral organism of standardization should be established. Adoption to already applied norms or to norms recommended by I.S.O. or other organizations should be stressed.
- Industrial accounting (cost accounting method) and necessary statistics should be developed.
- The set up of mechanisms which guarantee regular delivery of equipment and raw material would be important.

- Accelerated training programmes should be established.

3. Financial return:

The first alternative of steel tubes production, phase I would bring annual gross revenues of DA 21,450,000, annual production costs of DA 18,150,240 and an annual gross profit of DA 3,299,760. Phase II would bring annual gross revenues of DA 95,700,000, annual production costs of DA 69,090,600 and an annual gross profit of DA 26,609,400.

The second alternative of steel tubes production, phase I would bring annual gross revenues of DA 31,200,000, annual production costs of DA 23,643,000 and an annual gross profit of DA 7,557,000. Phase II would bring annual gross sales revenues of DA 138,450,000, annual production costs of DA 95,052,120 and an annual gross profit of DA 43,397,880.

Cast iron tubes production would bring annual sales revenues of DA 52,255,000, annual production costs of DA 45,829,608 and an annual gross profit of DA 8,702,000.

4. Economical benefits:

The assumed additional production of cast iron tubes would bring value added of 29.5% of sales revenues. The important substitution would have a positive effect on the country's balance of payments of \$ 8,702,000 per year. No indications of the added value and the effects on the balance of payments as to the steel tubes are given in the study.

5. Follow up action:

Memo Solian/Maneck dated 20-8-1974 : SORES Inc. should present a summary of their major findings and recommendations.

Letter Ellass/Maneck dated 23-8-1973 (in attached "Activités du project de la période début février à fin juillet 1973") : Study has been sent to Société Nationale de Sidérurfic (SNS), Société Nationale des Matériaux de Construction (SINCO), SONATRACH and to ministry of industry. Evaluation meeting of the study will be held in second part of Septemebr. Will communicate result of meeting in due time.

Letter Sores Inc./Newton dated 28-9-1973: Volume of "Summary and Conclusion" prepared.

Letter Maneck/Makicéo, UNDP dated 31-10-1973: Final report of Sores submitted to Government. Rapport final préparé pour le government Algérien (UNIDO/TCD 331) dated 12-7-1974: Project included in list of projects to be implemented during 1974-1980, page 79 of above report.

Discussion with Mr. Anderson, ICIS (who was in charge of the project) dated 13-10-1977 : Mr. Anderson does not know whether the project has been implemented or not.

003323

Inventory of Feasibility Studies

Country: Lesotho (LES)

Industrial Sector: Textile industry (31.7.B)

Serial Number: 18

Classification: 77/18/01/LES/31.7.B/F/Blankets

Title of study: A feasibility study of blanket manufacture - the Kingdom of Lesotho (DP/LES/73/030)

Date of study: 29 November 1974

Author of study: A. Johnels and G.H. Oxtoby (both of International Wool Secretariat)

Sponsoring agency: UNIDO, Government

1. Description: The study analyzes the Lesotho market and comes to the conclusion that a mill producing about 600,000 blankets would be appropriate for Lesotho. The annual production could be 275,400 units/year of fashion blankets, 120,000 units/year at domestic blankets, 90,000 units/year of Travellings and 90,000 units/year of Greys. Investment costs were estimated at 2,200,000 R. The Government of Lesotho offers various incentives to firms. Two of these, a utility and transportation allowance and a citizen wage allowance are relevant to the study. The best location of the mill would be Maseru. The mill will suffer disadvantage because of the lack of supporting industries and facilities.
2. Recommendations: The mill in Lesotho would have higher costs than those of the foreign supplier. By analyzing various policies which might, even in these circumstances, make the mill viable, the study considers that none of these will be effective and therefore concludes that it would not be feasible to establish a blanket mill in Lesotho. There may be other textile possibilities in Lesotho which might be worth investigating such as wool production (tops - fine worsted, fine woollen yarns, coarser woollen yarn).
3. Financial returns:
Annual gross sales revenues are estimated at 3,900,000 R assuming an average price per blanket of 6.5 R.
No indication on profit, rates of return in the study.
4. Economical benefits:
The only economical benefit of a blanket manufacture in Lesotho seems to be the import substitution. This could be important, and Lesotho depends heavily upon one big producer in South Africa who has nearly the whole market share in Lesotho.
5. Follow-up actions:
- memo Franava/Hadeiba dated 16/1/1975: Report should be submitted to Government. Should the Government decide to proceed with the establishment of the factory despite the anticipated difficulties, the report would provide valuable guidance that it clearly highlights possible pitfalls. In addition it contains a detailed production profile for a blanket factory.

- - Letter ResRep/Maneck dated 12/2/1975: Report submitted to government. As soon as government's reaction is known, he will inform UNIDO.
- - Letter Shutt, Fund for Research and Investment for the Development of Africa Ltd/Eraneva dated 29/9/1977: The above organization has been requested by the Lesotho Government to consider the possibility of such a project!
- Discussion with Mr. Eraneva on 18/10/1977: Project is technically and even economically feasible; the only problem is a marketing problem: one big producer in South Africa who has nearly the whole market share in Lesotho can ruin the project. Mr. Eraneva doesn't know whether the project is going to be implemented.

Inventory of Feasibility Studies

Country: Morocco (MOR)

Industrial Sector: Food industry (31.7.C)

Serial Number: 19

Classification: 77/19/01/MOR/31.7.C./F/Fish protein concentrates

Title of study: Usine de concentrés protéiques de poisson: étude de faisabilité (DP/MOR/70/533) - Rapport final (doc: UNIDO/TCO/SF. 48)

Date of study: 21. 5. 1974

Author of study: M. Gerolt Lovold

Sponsoring agency: UNIDO, Government

1. Description: The study analyses the SONAFAP factory and comes to the conclusion that under existing market conditions, the production of fish concentrates is not feasible.

Certain modifications in the existing production lines guaranteeing better hygienical conditions, the factory could produce ordinary fish protein concentrates if there is a market for these products. In this case capacity of the production lines could be between 30,000 and 35,000 tons of fish treated per year. The investment costs would then be \$ 700,000.

2. Recommendations:

Ordinary fish meal and upgraded fish meal could be produced. This should be done by a doubling of the capacity of the first production line from 6 t/h to 12 t/h of raw material (30,000 to 35,000 tons of fish per year), the trebling of the upgraded capacity (extraction), and the chartering of two modern 150 TDW purse seiners for the exclusive provision of fish.

3. Financial returns:

No indications are given in the study concerning sales revenues, production costs, profits or return on investment of the additional production. The only figures available are the gross sales revenues of SONAFAP in 1972 amounting to 3,076,500 dirhams, the production costs of SONAFAP in 1972 amounting to 2,946,215 dirhams.

4. Economical benefits:

The project would have a positive effect on the balance of payments of the country as less finished products would have to be imported and as the raw material is abundantly available. Besides of above new jobs could be created which would involve an additional income.

5. Follow-up action:

UNDP/UNIDO assistance consisted of the supply of consultants to the SONAFAP factory and some equipment for the plant and for discharging the fish import. During the consulting service to SONAFAP, a feasibility study was worked out to improve the existing conditions of SONAFAP. In 1973 the SONAFAP was interested in a joint venture in fish protein concentrate production but it seems that the interest of SONAFAP ceased when the price of fish meal went up. As far as UNIDO is concerned, technical assistance to the plant was terminated in 1973 and UNIDO had practically no contacts with the management of the plant since.

- letter Lovold/Maneck dated 27/11/1974: "From reports from Morocco I learn that SONAFAP operation has been very successful since we terminated our UNIDO project, and that our recommendations for expansion are being followed".
- letter Norlindh, Astra Nutrition AB/Agro-industries dated 2/9/76: SONAFAP has written to Astra and suggested a co-operation. Astra would be ready to put scientific, technical and commercial know-how at the disposal of SONAFAP, but is not willing to take part in a financing of a FPC factory in Morocco.
- letter Aref/Norlindh, Astra Nutrition AB dated 13/9/76: In principle, UNIDO would be willing to provide additional assistance to SONAFAP, but this could be done only if the Moroccan Government requests such assistance and if the necessary funds are made available by UNDP or some other source, e.g. the Government itself.
- letter Norlindh, Astra Nutrition AB/Aref dated 5/10/1976: Contacts with SONAFAP are continued. The SONAFAP general manager will come to Astra in 1977.

003325

Inventory of Feasibility Studies

Country: Algeria (ALG)

Industrial Sector: Food industry (31.7.C)

Serial Number: 20

Classification: 77/20/01/ALG/31.7.C./P/Molasses

Title of study: Etude sur les différentes utilisations de la mélasse en Algérie (DP/ALG/72/005)

Date of study: November 1971

Author of study: M. Ismail, expert - consultant at C.E.I.T.

Sponsoring agency: UNIDO, Centre for Industrial Studies and Technology (C.E.I.T.)

1. Description: The study analyses two types of molass yeast i.e. the panification yeast (levure de panification) and the fodder yeast (levure fourragère). Production of panificated molass were suggested with a capacity of 11,000 t/y of sugarbeet molass and 14,000 t/y of refined molass. The investment costs of such a factory would amount to DA 8,806,000 including a working capital of DA 3,300,000. The break even point of the factory would be at 70% of production.

2. Recommendations:

- Only production of panification yeast is recommended as fodder yeast production would not be profitable
- The economical conditions for a plant of fresh yeast are more interesting than those of a dry yeast manufacturing plant

3. Financial returns:

The net annual sales revenues would be DA 5,454,000, the annual production costs would be DA 4,460,500 and annual net profit would amount to DA 497,250. The annual return on investment would be at 11.4 %.

4. Economical benefits:

The molass production is intended to be sold at the local market. The resulting import substitution effect would have a positive effect on the balance of payments of DA 8,000,000 per year.

5. Follow-up actions:

The study was achieved by Mr. Ismail, expert-consultant at the Centre for Industrial Studies and Technology. The study had the purpose to valorize by-products of the sugar industry (molass) by making a feasibility study on the different transformation possibilities of this product (fodder, yeast). The annual production of 25,000 tons/year of molasses is based on the existing factory of El-Khenis and the 2 factories under construction (Guelma and Mostaganem) which both started production in 1973. No other relevant information was found in the registry file and it is not clear, whether the above sugar factories are already treating the molass or not.

Inventory of Feasibility Studies

003326

Country : Sudan (SUD)

Industrial Sector : Pulp and Paper (32.1.E)

Serial Number : 21

Classification : 77/21/01/SUD/32.1.E/F

Title of study : Feasibility study of the manufacture of Pulp and Paper
in the Upper Nile Province - Republic of the Sudan

Date of study : January 1969

Author of study : Dr. J. Grant

Sponsoring agency : UNIDO, Government

1. Description

It has been felt by the Government that the development of some local industry in the Upper Nile Province, preferably utilizing local raw materials and local labour would create confidence and have a general stabilizing influence on affairs in the Province. It was appreciated at the outset by all concerned that such a project might not prove to be viable or perhaps be only borderline economically. The study concluded that if profitability is the only or main consideration, then the whole idea of a pulp and paper mill in the Upper Nile Province, using papyrus or any other local fibre, should be completely abandoned. But the social implications of a paper making industry in the Upper Nile Province are fully appreciated and it is realized that the arguments in favour of the industry are very strong from this point of view. The study suggests the erection of a factory using equipment of the old plant located in Aroma. The investment costs would then be £ 800,100 including £ 75,600 of working capital. Production would be 6400 t/y of wrappings and flutings and 6400 t/y of white-lined box board.

2. Recommendations

- The whole plant and equipment at present installed at the Aroma cardboard factory should be dismantled, taken to Halakal and re-erected.
- If any course involving the use of papyrus is decided upon, a detailed study should be made of factors such as botany, ecology, pulping behaviour and properties, storage behaviour, harvesting methods, transport costs, etc.
- If the decision goes against the mill in the Upper Nile Province, it is then suggested that the feasibility of a mill in the Kashm el Girba area be considered as a longer-term project. If it is desired however to keep the Aroma project in being, it may be possible to manufacture the pulp requirements of that mill at the Kashm el Girba factory and to send the pulp to Aroma.

3. Financial returns

At annual gross sales revenues of £ 966,400 and annual production costs of £ 952,832 there would be an annual gross profit of £ 9,568.

4. Economical benefits

As there is considerable unemployment in the Upper Nile Province, the project would have important socio-economical effects as there would be about 537 new jobs created by the erection of the factory.

5. Follow up action

As the recommendations of the study are unfavourable to a set up of a pulp and paper mill in the Upper Nile Province, it seems that no follow up is needed.

In project SM/SUD/73/035 the government was again interested in a feasibility study in the pulp and paper industry and the feasibility of expanding production capacity of the Blue Nile Packaging Corporation. UNDP turned down the feasibility studies, saying that investigations were done on several occasions and results have been generally negative. An expert was sent for 3 months to the Blue Nile Company to help to improve the operation of their mill. A project was also proposed to revitalize the equipment of the Aroma factory shut down in 1968.

All above seems to show that the development of a pulp and paper manufacture in the Upper Nile Province has been given up.

Inventory of feasibility studies

003327

Country : People's Republic of Congo (PRC)

Industrial Sector : Food Industries (31.7.C)

Serial Number : 22

Classification: 77/22/01/PRC/31.7.C/F/Pineapple

Title of study: Etude techno-économique de viabilité d'une installation de traitement d'ananas en république populaire du Congo (IS/PRC/71/801)

Date of study : March - September 1972

Author of study : I.F.A.C. (Institut français de recherches fruitières outre-mer)

Sponsoring agency : UNIDO, Government

1. Description:

The investigations on the feasibility of a pineapple complex in the Niari valley shows that this complex does not seem to be interesting from the point of view of investments. The analysis by the discounted autofinancing method at an internal rate of return of 12% shows over 13 years a profitability rate of only 0.5% (Profitability rate = discounted autofinancing divided by discounted investment). It is doubtful whether under these conditions an investor can be sought.

The production of the Congolese pineapple complex will not be competitive on open markets, and only a very important participation on the French market would guarantee its feasibility. The total costs of investment would be \$ 12,767,360. A production of 16,581 t/y of canned pineapple, 8086 t/y of compot and 2054 t/y of concentrates was assumed.

2. Recommendations

- A high degree of uncertainty stays concerning the industrial production in the Niari valley because of lack of experience in such an activity, lack of plants and lack of skilled labour. Preliminary operations are needed before the set up of the complex such as agricultural tests with technical control of fruits, introduction and intensive expansion of plants, training of labour.
- The high cost of raw material is to be reduced by increase in yield, suitable varieties and irrigation techniques.

3. Financial returns

Annual gross revenues will be \$ 9,325,020, annual production costs will be \$ 8,120,000 and annual gross profit will amount to \$ 1,299,000. At an internal rate of return of 12%, a profitability rate of 0.5% will be expected over 13 years of production.

4. Biological benefits

- The project would use raw material of the country and by processing it, would yield a higher added value. The export of finished products would have a positive effect on the balance of payments of the country.
- Plantations of pineapple and the factory would create new employment.

5. Follow up action

Another study with the title "Conditions d'implantation d'un complexe agro-industriel d'ananas dans la vallee du Niari/Congo - Brazza was done in 1969-70 for UNIDO by K.Jakovljevic which was to be found unsatisfactory (see memo Mautner/Maneck dated 20-8-1970).

Memo Mautner/Maneck dated 4-12-1972 : Positive evaluation of the study. The study should be submitted to government and FAO. FAO should be informed ~~of~~ that in UNIDO's opinion the subject should now be dealt with by them (see also letter Quijano Caballero/Hartmans, FAO dated 8-12-1972).

Letter Hartmans; FAO/Res.Rep dated 1-3-1973 : FAO's input to the Country Programming Exercise did include a project proposal concerning the development of pineapple production. It is noted however that no reference is made to this project in the recently received country programme for the Congo. It would then appear that the Congolese Government is not giving priority to this project and FAO wonders whether any further steps are meaningful in this case. If however the Government does reconsider the position after the IFAC report, FAO would agree to further research and experimentation and would be prepared to assist in this.

Inventory of Feasibility Studies

003328

Country : Tunisia (TUN)

Industrial Sector : Basic chemicals (32.1.C)

Serial Number : 23

Classification: 77/23/01/TUN/32.1.C/F/Fluor hydric acid

Title of study: Possibilités de fabrication d'acide fluor hydrique et de ses dérivés à partir de spath - fluor Tunisie (DP/TUN/66/515)

Date of study : October 1970

Author of study : Centre National d'Etudes Industrielles (CNEI)

Sponsoring agency : UNIDO, Centre National d'Etudes Industrielles (CNEI)

1. Description

Two complexes were analysed : Complex A with intermediate production of fluorhydric acid and final products of cryolithe and aluminium fluoride, Complex B with intermediate production of fluor-hydric acid and the only final product of aluminium fluoride. Both products enjoy an increasing demand and so prices will not drop in the following years.

The Complex A would need total investment of \$ 6,724,000 including \$180,000 of working capital. The capacity of this complex is foreseen for production of 10,600 t/y of fluorhydric acid, 8,000 t/y of cryolithe and 8000 t/y of aluminium fluoroide.

The complex B would need total investment costs of \$ 5,400,000 including \$ 180,000 of working capital. The capacity of this complex is foreseen for production of 10,600 t/y on fluorhydric acid and 15,500 t/y of aluminium fluoride.

2. Recommendations

- Both complexes are feasible but complex B is economically more interesting. As the marketing part of the study shows an obvious preference of consumers for aluminium fluoride, and as prices develop also in favour of aluminium fluoride compared to cryolithe, whereas production costs for both products stay more or less the same, the production of cryolithe should be questioned.
- Discussions with potential clients should offer aluminium fluoride first and only other cryolithe in the second place to try to get a market of about 15,000 to 16,000 t/y of fluoride.

3. Financial returns

Complex A would yield annual gross sales revenues of \$ 4,840,000, annual production costs of \$ 3,007,000 and an annual gross profit of \$ 1,833,000. The DCF rate would be 24%.

Complex B would yield annual gross sales revenues of \$ 5,115,000, annual production costs fo \$ 2,925,000 and an annual gross profit of \$ 2,190,000. The DCF rate would be 39%.

4. Economical benefits

- The project would induce important labour employment.
- The import substitution effect would have a positive balance of payments effect of \$ 12,175,000 discounted over 10 years.

5. Follow up action

- According to 8th semi-annual progress report of project TUN/66/515 for reporting period 1-3-1972 to 31-8-1972, Annex III C : "Projets en négociations et autres projets dont la réalisation est très probable", the project has been accepted for execution. The study has led to a market prospection and a detailed study (contract signed with A.D.Little, USA).
- Interim report November 1972 of project, Annex VI : Version II retained by agreement commission; foreseen start 1975/76. Promoter : ICF
- 9th semi-annual progress report for reporting period 1-9-1972 to 28-2-1973 : As a result of memo of the Centre contesting the quality of Arthur D. Little on the matter, a second study was asked to A.D. Little by ICF. Many firms and investors are interested in the project, but it might be feared that problems arise as regards capacity of mines.

Inventory of Feasibility Studies

Country : Ethiopia (ETH)

Industrial Sector : Fertilizers (32.1.F.)

Serial Number : 24

Classification : 77/24/01/ETH/0/32.1.F/P

Title of study : Pre-feasibility study - Fertilizer manufacture in Ethiopia (IS/ETH/71/808)

Date of Study : 20 December 1972

Author of study : J.S. Carrer

Sponsoring Agency : UNIDO, Government

003329

- I. Description: The study states that the fertilizer demand in Ethiopia will grow steadily. The most suitable fertilizers for Ethiopia are urea and di-ammonium phosphate (DAP). The combined consumption of these fertilizer materials will grow from 25,000 tons in 1972 to 600,000 to 850,000 tons per year in the year 2000.
- In phase I the bulk import of the required fertilizer materials with local bagging operations is suggested. The capacity of the installations will grow from 50,000 t/y of combined fertilizer in 1975 to 330,000 tons in 1983. Investments till 1984 : \$ 7,966,000.
 - In phase II the fertilizer complex will start in 1984, when the yearly demand in Ethiopia is 200,000 tons of urea and 150,000 tons of DAP, that is in the year 1984. Full capacity of the complex will be reached when the complex produces 280,000 tons of urea and 200,000 tons of DAP which will happen in the year 1991. The fertilizer complex will also include an Ammonia plant (2000 t/y of ammonia or 165,000 tons per year of Nitrogen), a Phosacid plant (95,000 t/y) and a Sulphuric acid plant (270,000 t/y). The raw materials required will be sulphur, found at various places in Ethiopia, but layers insufficient, phosphate rock which is not yet found in Ethiopia and naphta, a petroleum product (crude oil for refineries must be imported).
- II. Recommendations:
- As the sulphur and rock imports involve great quantity movements, the sulphuric acid and phosphoric acid plants should be situated near the harbour of import, in this case Assab. The ammonia and urea plants need naphta and their location could well be in the neighbourhood of the refinery.
 - The rapid changing conditions make it necessary to check from time to time the assumptions of this pre-feasibility study such as world market prices of the raw materials and fertilizer products and demand growth in Ethiopia.
 - The Technical University and Technical Schools should already now plan to set up courses in chemical engineering for the future demand on chemical engineers.
 - Another pre-feasibility study is required in 1977, that a full feasibility study should be carried out in 1979, that one could start with ordering in 1981 and that the actual start up of the complex could take place in 1984.

- In the next pre-feasibility study it should be studied whether at that time the phosphoric acid and/or the sulphuric acid units could not be omitted and the acids be more economically imported.

III. (a) Financial returns

For the bagging plant the internal return will be 16% when the plant is started up in 1975. The rate increases slightly with each year later start up until some 19% for 1980. For the fertilizer complex the internal return will be 12.4% which could be increased to 13.5% if the building period is decreased from the projected 3 years to 2 years times.

(b) Economical benefits

- 230 persons will be employed by the initial bagging plant and 616 persons will be employed in the fertilizer complex with an investment per employee of \$ 265,000.
- At full production in 1991, operating costs will amount to \$ 49,823,000, the total revenues will then be \$ 81,800,000 per year.
- The savings on foreign currency of the bagging plant are some \$ 71 million if the project has a 20 year life time. If however the operations are taken over by the manufacturing plant in 1984, the bagging plant has still saved the country about \$ 16.5 million on foreign currency. As for the fertilizer complex the savings are considerable and will grow in 20 years life time of the project to \$ 570 million in total.

IV. Follow up action

- Staff member mission confirms that there exists a possibility of bulk imports with bagging facilities and later a bulk blending possibility.
- Memo Varghese/Tamimi dated 12-1-1973 : Pre-feasibility study of Mr. Garrer favourably evaluated by substantive division.
- Letter Maneck/Res.Rep. UNDP dated 18.1.1973 : Pre-feasibility study sent to Res. Rep. for submission to the Government.
- Letter Res.Rep. UNDP/Maneck dated 28.5.1973 : Project Data Sheet prepared for expert to refine and finalize the demand projections of fertilizers.
- Project IS/ETH/73/009 : Report on establishment of bulk handling, mixing and bagging plant for fertilizer dated April 1975 by Mr. Geerling.
- Letter Geerling/Ato Wondmossen Sahle, AID Bank dated 6.4.1976 : Enquiry whether the plant has been ordered. In letter of 12 August 1975, AID mentioned that Chartim Company's offer was considered the best.
- Letter Veliky/Res.Rep. UNDP dated 5-10-1977 : In 1974/75 Mr. Geerling executed the project IS/ETH/73/009. Since then no follow up work was requested by the Government.
- Discussion with Mr. Keleti, Chemical Industries Section dated 31.10.1977 : No reaction from the Ethiopian government since. The factory was never built and Mr. Keleti thinks that the Government is not interested for the time being.

Inventory of Feasibility Studies

003330

Country : ETHIOPIA (ETH)

Industrial Sector : Pesticides (32.1.6.)

Serial Number : 25

Classification : 77/25/01/ETH/32.1.G./P

Title of study : Pre-feasibility study on the establishment of a dust formulation plant in Ethiopia (IS/ETH/71/803)

Date of study : 10 October 1972

Author of study : J.S. Garrar

Sponsoring agency : UNIDO, Government

- I. Description: The study states that neither a sophisticated manufacture of technical active materials of the pesticides (rather small market, lack of raw materials, high capital investments requirements), nor a liquid formulation plant (lack of raw materials to produce organic solvents, lack of storage possibilities, lack of industrial toxicants, little foreign exchange savings and poor economic viability) is advisable. A solid formulation plant seems feasible. The demand for dust formulated pesticides will grow from 322 t/y in 1974 to 13,731 t/y in 1985. DDT, Lindane and Malathion. all three broad spectrum insecticides are to be used in the dust formulation plant and locally mined limestone, Kaolin or talcum could be suitable raw materials for the dust diluent. The insecticide dust shall be used against insects on crops, stored grains insects and household pests. The dust formulation plant will ultimately have a capacity of 15,000 t/y of dust when working on three shifts a day and the capital investment of the installation is \$ 690,000. The project shows little risk and a good profitability. Also the capital requirements are relatively small. It is, therefore, a very good case for private enterprise, which should be invited as soon as possible to step in.
- II. Recommendations: A full feasibility study should be carried out as soon as possible and the results should be made known to private enterprise.
 - An open but 100% Ethiopian share company should be established with an equity capital of \$ 250000.
 - Sales prices should be established in such a way that the farmers could benefit from the application of insecticide as far as possible and leaving the company a fair profit.
 - The organization for proper control of pesticides should be extended; the tasks of the organization backed by law should be : quality control, residue control and licensing. The cost of such an organization can be covered partly or entirely by levying access on imported toxicants and pesticide concentrates and products.
- III. (a) Financial Return

Assuming a sales price of dust of \$ 0.50 per kg of all types of dust, the internal rate of return would be 41.8%. For a sales price of \$ 0.45 per kg, the internal rate will be 29.3% and for a sales price of \$ 0.40 per kg, the internal rate will be 13.3%. It is expected that an ex-works sales price of between \$ 0.45 and 0.50 per kg. will be possible. This should however be further investigated in the full feasibility study.

(b) Economical benefits:

- At full production (1987 : 15,000 t/y) annual operating costs will amount to \$ 5,521.800. The corresponding sales revenues, assuming a price of \$ 0.50 per kg will amount to \$ 7,500,000, assuming a price of \$ 0.45 per kg \$ 6,750,000 and at 0.40 per kg \$ 6,000,000.
- The project will save the country in its life time (21 years) approximately 45 million Ethiopian dollars.
- The economics of pesticides are considerable and the return by way of increased crops is normally several times greater than the pesticide outlay.
- Most of the equipment can be made locally, which is attractive for the Ethiopian industry and will save foreign currency.
- At full capacity, the new plant will create 49 jobs.

IV. Follow up action

- Memo Verghese/Maneck dated 3.1.1973 : Principle agreement with report. The only deficiency is that a follow up work plan is included which would outline the terms of reference for UNIDO assistance in the second phase of the project.
- Letter Maneck/Res.Rep. dated 19.1.73 : Pre-feasibility study to be submitted to Govt.
- Letter Maneck/Res.Rep., UNDP dated 13.2.1973 : Project Data Sheet and job description prepared by substantive division for pesticide dust formulation plant.
- Discussion with Mr. Szabo, Chemical Industries Section, dated 31.10.1977 : The dust formulation plant project was given up, as UNIDO expert Mr.G. Andreassen stated in his report done in 1975, that a liquid pesticide formulation plant was more advantageous. In a letter to Mr. Ato Bayes Balayneh, Head of Plant Protection Division, Ministry of National Resources Development dated 16.9.1976, Mr. Szabo expressed the eagerness of UNIDO to follow up the liquid pesticide formulation plant project and the willingness of UNIDO to offer further assistance. No positive reaction of the Ethiopian Government since.

Inventory of feasibility studies

003331

Country : People's Republic of Congo (PRC)

Industrial Sector : Heavy clay, ceramics, glass and allied products industry (32.1.B)

Serial Number : 26

Classification: 77/26/01/PRC/32.1.B/P/Ceramics

Title of study: Etude sur les possibilités de fabrication de matériaux en céramique en république populaire du Congo (IS/PRC/71/805)

Date of Study : March 1973

Author of study: B C Berlin - Consult GmbH, Berlin, FRG

Sponsoring agency : UNIDO, Government

1. Description

The People's Republic of Congo have had several studies confirming deposits of clays, Kaolin and feldspath. This study was done to find out the possibility of building up a ceramic industry. The study came to the conclusion that from the point of view of raw materials, favourable conditions exist to set up a ceramic industry. The study analyzed the conditions of a fine ceramics industry, namely stone ware tiles, earthenware tiles, ceramics for sanitary wares and china ware. As the capacity of the Congolese market for above ceramics are respectively 500 t/y, 120 t/y and 100 t/y, the study disrecommended tiles production as the market for these products was far too small to start a feasible industrial production. It was suggested that a production could be started at a pilot plant scale producing about 120 t/y of china ware and 60 t/y of artistic ceramics, starting with production of china ware. The capacity of the pilot plant could be risen to 1000 t/y if the market demand would grow. In the beginning the factory would work with losses which could be financed by subsidies of the government and by measures of tax protection.

2. Recommendations

- Although the study concluded that under present market conditions a ceramic production did not seem feasible, it suggested a pilot plant production. This pilot plant production should be done in a test station attached to the still existing MAAC (Manufacture d'Art et d'Artisanat Congolais) of Brazzaville as MAAC has already qualified personnel.
- A sales organization should be established to handle both the sale of chinaware and of artistic ceramics.
- After start up of production, one should try to export the fabricated products to the neighbouring countries. If this is successful and if the local market of china ware develops, one could increase slowly the production capacity.
- Prior to start up of production, further investigations should be done concerning the quantity and quality of raw materials deposits starting with these deposits which are favourable regarding transportation facilities such as the clay deposits of M.A.A.C. at Brazzaville and the deposits near Goma Tzé Tzé, Kibossi and Hamon.

3. Financial return

No financial returns can be expected as long as the factory is producing at a pilot plant level. The break even point would be around a production of 800 t/y.

4. Economical benefits

At investment of 160,950,000 F CFA, production costs of 55,750,500 F CFA and sales revenues of 53,700,000 F CFA, the pilot plant would suffer losses of about 2,000,000 F CFA which should be covered by Government subsidies. The pilot plant operation would create 44 new jobs. As all china ware is imported there should be some savings on foreign currency but the amount of these savings is not mentioned in the study.

5. Follow up action

- Memo Watson/Newton dated 2.5.1973 : Report evaluated and found in order for submittance to the government.
- No other relevant information in the registry files.
- Discussion with Mr. Biering, Chemical Industries Section dated 31.10.1977 : Mr. Biering does not know what was the follow up of this project or whether the government is interested or not to set up a ceramic pilot plant production.

Inventory of Feasibility Studies

003332

Country : Mali (MLI)

Industrial Sector : Food Industry (31.7.C)

Serial Number : 27

Classification: 77/27/01/MLI/31.7.C/F/Cashew Nuts

Title of study: Etude de faisabilité d'une décortiquerie d'anacarde à Sikasso (SM/MLI/75/006)

Date of study : 9 August 1976

Author of study : P. Duchene and J.A. Verrier

Sponsoring Agency : UNIDO, Government

1. Description

In a first phase of the project, 6 industrial options were analyzed to set up a fruit transformation industry : (1) Sorting and conditioning unit for fresh fruits and vegetables (2) fruit and mango canning unit (3) fruit juice unit (4) essential oils of lime unit (5) fruit drinks unit and (6) cashew nuts treatment unit. These 6 options were analyzed in a first report entitled "Etude des conditions d'implantation d'unités de transformation des fruits de la région de Sikasso". From these 6 options 4 were found feasible i.e. (1), (4), (5) and (6). In phase two, the authorities of the Mali government decided that only a feasibility study on solution (6) should be prepared. The feasibility study states that the cashew nut unit is feasible. The international market for cashew nut is growing, demand is increasing at a higher speed than offer, selling prices on international market are rising fast. The production should start at 1700 t/y (which is the break even point) and grow to a capacity of 4000 to 5000 t/y. Gross benefit per year would be 211 millions FM per year with the corresponding sales of 800 millions of FM and production costs of 589 millions FM, allowing though a cumulative benefit of 1626 millions FM in 11 years (1978 - 1991). Investment costs would be 300 millions FM for the factory, 100 millions FM for renovation of existing plantation (2000 ha) over 5 years and 680 millions FM for new plantations (4000 ha) over 3 years. The factory could be set up within 2 years.

2. Recommendations

- 4000 ha of new plantations should be set up, 1000 ha in first year, 1500 ha in second and third year,
- Inventory of existing plantations and start up of new plantations in 1977.
- Start operations of the factory in 1980. Two years before starting operations one should begin to train technical counterparts, identify principal importers and negotiate with them the contingents to be delivered, precise programming of the set up of the factory.
- Information and training of local farmers, guarantee the farmer the buying in quantity and in price paid.

3. Financial returns

The return on investment would amount to 18.7% per year and the return on turn over (profit divided by gross sales revenues) would amount to 26.4% per year.

4. Economical benefits

- Besides of the accumulated benefits of the factory of 1626 millions FM over 14 years, the farmer's cumulative income will be 1786 millions FM at a price of 50 FM/kg of nuts.
- The factory would create 51 new permanent and 82 seasonal jobs.
- As all the cashew nut kernels are supposed to be sold on external markets, the positive impact on the balance of trade would be 800 millions FM.

5. Follow up action

- Memo Aref/Siddiqui dated 14-10-1976 : Work performed by the two experts is of first class quality.
- Memo Siddiqui/Cuevas Cancino dated 30-11-1976 : FAO would like to have copies of studies as a potential investor had expressed interest in them.
- Several potential investors have been approached.
- Discussion with Mr. Moreira Diaz dated 2-11-1977 : A Swiss company is apparently interested to implement the project. The outcome of discussions between the Swiss Company and the Mali authorities are not known yet.

Inventory of feasibility studies

003333

Country: Western Samoa (WES)

Industrial Sector : Wood Processing and wood products industry (31.7.A)

Serial Number : 28

Classification: 77/28/02/WES/31.7.A/F/Matches

Title of study: A study on the Feasibility of establishing a Match Industry in Western Samoa (IS/WES/75/003, doc. UNIDO/IOD 26)

Date of study : 14-6-1976

Author of study: Mr. S. Ramachandran

Sponsoring agency: UNIDO, Government

1. Description

The purpose of the project would be to use local raw materials of timber which is of good quality to establish a match factory intended as an import substitution venture. The basic conditions in Western Samoa for establishing a match factory as availability of good quality soft wood, manual labour, possibility of production at fair prices and existence of infrastructure including power, water services, labour facilities are quite favourable. Some raw materials such as potassium chlorate, zinc oxide, sulphur, red phosphorous, etc. have to be imported but the quantities involved are comparatively low and so years requirements can be imported at a time; other raw materials such as starch, Kieselguhr, silica are available in Samoa. 3 to 5 million boxes/year will be produced in a first phase of 2 years, in a second phase (2 years) production will be increased to 10 - 20 million boxes/year depending on export orders. Phase I would require US\$ 218,000 of investment, phase II would need additional US\$ 116,000. 30% of production could only be sold at the local market but there are good possibilities for export such as to other South Pacific Islands, and splints to Middle East and New Zealand.

2. Recommendations

- Apia will be the ideal location since service costs can be kept down.
- A critical evaluation of the project demands examination of some uncertain factors, especially prospects of export of matches and splints. Until vital information is accumulated by study of the export markets, Phase II of project cannot be launched.
- With a dynamic marketing organization, export potential of matches could be fully utilized. Export markets for splints could be usefully investigated if good quality impregnated and polished splints, dried in mechanical driers, cleaned, sieved and compactly packed in moisture sealed cartons are produced.
- Implementation of phase I will require services of an expatriate experienced engineer who will manage the factory for a period of 4 to 6 months and 3 expatriate technicians for a year. Phase II will require the services of an expatriate engineer for 2 years and three technicians for the same period. During this period local personnel will be trained to take over the functions progressively and will manage the plant entirely by the end of the two year period.

3. Financial return

With a production of 5 million boxes of matches per year, the production costs per year would amount to US\$ 85,000. During the first 5 years the average annual profit before income taxes would be US\$ 74,000, and the corresponding average annual return on investment would be 33.8%.

4. Economical benefits

- The factory would create 33 new jobs.
- The project would not only be import substituting but would also bring foreign currencies, as at full production, 70% of the production is to be exported.
- Nearly all raw materials required for production is available in the country itself.

5. Follow up actions:

- Study was favourably evaluated by Agro Industries Section.
- Letter Reddy, Regional Ind. Adviser/Aref dated 18-8-1976 : Mr. Ramachandran's services are required for a period of one year for establishing the industry.
- Discussion with Mr. Bassili dated 2-11-1977 : The project is under implementation. Equipment has been bought and Mr. Ramachandran is in Western Samoa to help with the installation of the equipment, and the starting up of the factory on project SI/WES/76/006.

Inventory of Feasibility Studies

003334

Country: Tunisia (TUN)

Industrial Sector : Basic Chemicals (32.1.C)

Serial Number : 29

Classification: 77/29/01/TUN/32.1.C/P/Sulphuric Acid

Title of study: Etude comparative des différentes sources de fabrication d'acide sulfurique (Soufre, Pyrites, Gypse)
(DP/TUN/66/515)

Date of study : January 1970

Author of study: Centre national d'etudes industrielles (C.N.E.I.)

Sponsoring Agency : UNIDO, Centre national d'etudes Industrielles(C.N.E.I.)

1. Description

The purpose of the study was to find out by which method the deficit on sulphuric acid could be covered. The Tunisian 4 years plan 1969-1972 foresaw needs in sulphuric acid of 1,200,000 tons and the provisions of actual production of 835,000 tons, having though a deficit of 365,000 tons. The different raw materials analyzed were sulphur, pyrites, natural and phospho-gypsum. Direct import of sulphuric acid was not considered, which, though feasible and realized for small quantities (1,000 to 2,000 t/y) would need a special study for the quantities in question. Therefore only the case of national production was considered. The study foresees other technical possibilities in the near future which could be studied, such as pilot studies treating phosphogypsum with modern technical methods. The study gives investment costs, production costs, internal rate of return, calculations for the 3 different raw material based production of sulphuric acid.

2. Recommendations

- For reasons of profitability, the ex-gypsum fabrication of sulphuric acid cannot be retained because of too heavy investment costs.
- The alternative ex-sulphur fabrication seems to be the most adequate as investment costs are half of that of an ex-pyrite production, and technical exploitation can be done without any problems. The disadvantages could be : sulphur is to be imported, so foreign currency outflow; prices of sulphur are subject to fluctuations, the supply must be absolutely guaranteed.
- A sulphuric acid plant based on sulphuric acid is proposed having a capacity of 300,000 t/y at investment costs of \$ 7,570,000.

3. Financial return

At a buying price of \$ 36/ton for sulphur and at a selling price of \$ 20 for sulphuric acid/ton the discounted cash flow rate would be 20%.

4. Economical benefits

- The ex-sulphur sulphuric acid production would generate steam which can be transformed into electricity.
- Low investment costs and low production costs.
- No noxious substances in raw material or in the product.
- No cumbersome by-products and no needs for auxiliary raw materials.
- 100 to 150 new jobs would be created.

5. Follow up action

Rapport intérimaire du project DP/TUN/66/515 of November 1972 : Study to be implemented by ICM (Industries chimiques Meghrébinea) for a factory of 1500 t/day at an investment of \$ 5,300,000. Start up of carrying out project in 1973. Foreseen start of operation 1975/76.

No other relevant information in the file.

Inventory of Feasibility Studies

003335

Country: Gambia (GAM) Industrial Sector: Light non-ferrous metals(31.8.A)

Serial Number : 30

Classification: 77/30/01/GAM/31.8.A/F/Ilmenite

Title of study: Technical and Economical Feasibility Report on Ilmenite Sand Treatment in the Republic of Gambia (RP/GAM/74/002)

Date of study : 1975

Author of study: "ZVETMETPROMEXPORT", Moscow, USSR
(All Union Scientific Research and Project Institute of Rare Metals, GIREDMET)

Sponsoring Agency : UNIDO, Government

1. Description:

The study evaluates the feasibility of ilmenite ore dressing plants for processing ilmenite sands at a yearly capacity of 500,000 tons and 1,000,000 tons respectively. The annual output of the plant would be, for variation I, 52,400 t/y of ilmenite, 3,000 t/y of rutile and 13,500 t/y of zircon. For variation II, the output would be 104,800 t/y of ilmenite, 6,000 t/y of rutile, and 27,000 t/y of zircon. The sands of the deposits of Batakunku and Sanyang would be used. These sands are readily upgraded. Reserves availability are estimated as 14 and 7 years respectively. The above deposits were described in a previous study of Mr. J.E.F. Marshall dated 31-5-1974 ; "Gambian titaniferrous beach sands", and figures of Mr. Marshall were accepted in their report showing reserves of 130,000 tons of ilmenite in Batakunku and 377,860 tons in Sanyang, in case of 3% cut off grade. In the case of 1% ilmenite cut off grade, the total increases to 605,420 tons. Gambia has favourable geographical situation that gives favourable economic possibilities for the export of the concentrates to European countries and USA.

2. Recommendations:

- Capital investment for the 2 variations would be 25.012 million dalassis and 34,690 million dalassis respectively, profit at expected prices would be 2,731 million dalassis and 8,849 million dalassis respectively. The most economically viable mining plant would be the plant processing 1,000,000 tons of sands.
- Efficiency and to some extent the possibilities of the marketing of the Gambian concentrates will be determined by the quality of the concentration.
- The products to be supplied are the products of large world demand and such a status is predicted to be maintained in future. Therefore the ready marketing is beyond of any doubt.
- Deposit reserves and the processing flowsheet are not sufficiently investigated. Estimates are of preliminary character and have to be specified on further project stages as the deposit is prospected and the concentration flow sheet is elaborated.

3. Financial return

For the 500,000 tons ilmenite processing plant the return on investment per year would be 10.9% (profit 2,731 divided by investments 25,012), for the alternative plant of 1,000,000 tons processed the return on investment per year would be 25.5% (Profit 8,849 divided by investment 34,690).

4. Economical benefits

- Variation I would create 355 new jobs and variation II 455 new jobs.
- Use of indigenous raw materials and positive effect on balance of payments due to export of ilmenite ore concentrates.

5. Follow up action

- The report was submitted to the government on 20-5-1976. Mathew Hall Ortech Ltd. of UK prepared on the request of the government another feasibility study in 1975 entitled "A feasibility study on processing titaniferrous deposits in the Gambia" followed by two complementary studies in 1976 : "Investigation on a zircon tailings dump and virgin titaniferrous beach sands in the Gambia", and 1977 : "Determination of heavy mineral reserves at Sanyang and Scout prospecting of the Gambian Coastline". The Mathew Hall Ortech study leaves also no doubt concerning the technical feasibility of a concentration plant.
- Report on mission to the Gambia and Senegal (7 - 18 November 1976) of Mr. Szakal : Mathew Hall Ortech, basing themselves only on the proven reserves in the Sanuang area foresees only 3.5 and 2 years content in the area. An investment of the order of US\$ 4 - 18 million is not justified for such a short life span. Consequently a strong programme of prospecting to increase proven deposits significantly is a first and main condition of any further steps. Consensus was reached on the reasonableness of a scenario for action as it was suggested by Mr. Hervouet, and agreed to before Mr. Alexandreme, the Minister of Industrial Development and Environment. This sounds (a) to approach several potential partners in a coming joint venture (b) to establish a study company (by about August 1977) (c) to decide on the staying of aid from UNDP funds, depending on the outcome of the dialogue between the government and their potential partners. UNDP assistance, if needed, will begin probably not before 1978.
- Letter Laugley, Permanent Secretary, Ministry of Economic Planning/ Szakal dated 26-8-1977 : International Finance Corporation is showing interest in the project.

Country : Sudan (SUD)

Industrial Sector : Food Industry (31.7.C)

Serial Number : 31

Classification: 77/31/01/SUD/31.7.C/P/Starch glucose

Title of study: Final report on Dura Starch Glucose project in the Sudan (IS/SUD/71/809, doc. UNIDO/TCD 156) combined with updating report (SM/SUD/72/052)

Date of study : 21 - 12 - 1976, updating report October 1975

Author of study : R. Besso

Sponsoring Agency: UNIDO, government

1. Description

The existing production of sorghum in the Sudan is approximately 1,500,000 t/y. It is planned to establish a plant for processing sorghum into starch and glucose as well as into other by-products. Calculations of the study are based on a 9000 t/y production of Dura which will give 1351 t/y of starch, 5000 t/y of glucose, 3475 t/y of cattle food and 122 t/y of Dura oil. A 1500 t/y production of Dura is recommended for the period 1975-1980 giving 5283 t/y of starch, 5000 t/y of glucose, 5793 t/y of cattle food and 204 t/y of Dura oil. The capacity of the plant should be increased in 1980 to 22,500 t/y of Dura giving then 9288 t/y of starch, 6000 t/y of glucose, 8688 t/y of cattle food and 305 t/y of Dura oil. The investment costs would amount to £ 2,014,000 of which £ 1,500,000 would be required in foreign exchange. This computation assumes tax free entrance of equipment into the country. The ideal location for the plant is in the Khartoum area. From enquiry stage to completion of project, it should take about 25.5 months.

2. Recommendations

- To increase profitability or reduce starch and glucose prices, effort will be required to establish a cattle food industry.
- There is a potential export market, and it is recommended that this be the subject of a further investigation.
- Future products such as textile starches, dextrans, dextrose, whole sugars, adhesives, caramels, paper starches, sizes etc. could be manufactured according to the demand.
- The up-to-date know-how of starch processing is in the possession of few large manufacturing companies, they have their own design of machinery their own secret methods. There are several alternatives open to a group seeking to construct a starch complex (a) hire a consultant (b) design and construct with local knowledge (c) form an alliance with a foreign starch company (d) purchase from a well known and respected contractor.
- Dura process is very similar to maize and with slight modifications, the plant can be adopted to use maize as a stand-by cereal.

3. Financial return

At annual sales revenues of £ 1,247,340, annual production costs of £ 868,431, annual profits of £ 378,909, the annual return on investment amounts to 18.81%. (This figures are based on a throughput of 9000 t/y of Dura). At a capacity of 15,000 t/y of dura, annual return on investment would become 68.72%.

4. Economical benefits

- The project will employ approximately 100 operators and a technical staff of 12, thus creating 112 new jobs.
- There will be a saving of £ 607,102 per annum minimum in foreign exchange.
- Import substitution, which is important, as the following industries being considered or implemented all require starch products. Textiles, soft drinks, foundries, food preparation, jute sack manufacture, dry batteries, paper making, cattle and dairy products, salt substitute for beers, fruit canning and bottling, meat packing.

5. Follow up action

The first study was done by Mr. Besso in 1972. After completion of the study the Government contacted several equipment manufacturers and was looking for potential foreign co-investors. Several firms have shown interest in the project. The project has not been implemented because the Government transferred its execution to the private sector, which, for a number of reasons, could not implement it. The Ministry of Industry and Mining decided that the approval, previously granted to the private sector was to be withdrawn and the public sector should execute it as early as possible. Therefore the study prepared in 1972 was to be updated. Mr. Besso reviewed his previous study and a complementary study to the previous one was completed in October 1975. Evaluation of substantive division was positive.

- Letter Maneck/Res.Rep. UNDP dated 18-12-1975 : UNIDO wants to bring to the Sudanese Government's attention that UNIDO was prepared to assist in the evaluation of offers, supervision of equipment installation, putting the plant into operation, etc.
- Letter Sepic/Besso dated 1-10-1976 : UNIDO does not have the latest information on whether the government has made the final decision on the establishment of a new plant or whether any action has been taken in this respect. So far no additional technical assistance from UNIDO has been requested.
- Cable misc 2243 Abed, UNDEVPRO/Veliky dated 1-11-1976 : "UNDP/FAO project SUD/75/009 Sorghum flour mill stop Equipment not yet installed. Operational earliest March 1977".

Inventory of Feasibility Studies

Country: Upper Volta (UPV)
Industrial sector: Food industry (31.7.C)
Serial number: 32
Classification: 77/32/01/UPV/31.7.C/P/ Mineral water
Title of study: Etude d'une implantation d'exploitation d'eau
de table en république de Haute-Volta (IS/UPV/71/813)
(doc. UNIDO/TCD.316)
Date of study: 12/6/1974
Author of study: J. Toussant
Sponsoring agency: UNIDO, Government

I. Description: The richness of underneath waters especially in the region of Bobo-Dioulasso is ascertained. The water delivery of this sources is constant independantly from the season. Although the national market is too small to have a profitable investment, the larger market of the C.E.A.O. and exports to the neighbouring countries (Ivory Cost, /could be con- Mali, Niger, Benin, Mauritania, Senegal, Togo)/ In this case the project sidered is feasible. It should be noted that a promotor from Upper Volta would be decided to invest and has the necessary capital.

Two alternatives were worked out. A would have a constant production of 2,400,000 bottles per year, B would have a production of 1,000,000 bottles in the first year, 2,400,000 bottles in the 2nd year and from the 3rd year onwards a production increase of 10 % per year. Investment costs would amount to 105,000,000 frs. The minimum production would be 2,400,000 bottles per year to satisfy the following demand Upper Volta 200,000 bottles/year, Ivory Coast 2,000,000 bottles/year, Niger: 160,000 bottles/year, Mali 40,000 bottles/year.

II. Recommendations: The alternative A would bring annual sales revenues of 85,000,000 FCFA and net profit of 22,103,250 F. CFA in the second year increasing to 37,853,250 F CFA in the year 15.

The alternative B would bring sales revenues of 57,000,000 F CFA in the first year increasing to 195,500,000 F CFA in the year 15, net profits would increase from 22,103,250 F CFA in year 2 to 94,642,650 F CFA in year 15. A large part of sales prices of mineral water due to local production would lead to an increased consumption of mineral waters in Upper Volta. This could help in the fight against diseases provoked by drinking of impure water.

Trade agreements should be concluded with the partners in the C.E.A.O. countries guaranteeing the necessary sales of the 2,400,000 bottles per year. In the study it was assumed that these sales are guaranteed.

III. Financial returns: For alternative A the return an investment would amount to 20 % the second year and to 35 % in the year 15.

For alternative B the return on investment would amount to 20 % in the second year and to 90 % in year 15.

IV. Economical benefits: The bottling of mineral water unit would create jobs in a region which is until now without industry; this would induce important external economics (shops, bars, transport). The annual value added of 31,000,000 F CFA for alternative A and of 28,000,000 F CFA of alternative B could be expected. The project would be to a great extent of an import substituting nature, and would have a positive effect on the balance of trade, as nearly all mineral waters are imported.

V. Follow up action: - Memorandum Mautner/Maneck dated 8/11/1973: Evaluation of the feasibility study: the study has not brought the bottling plant project in Upper Volta any closer to its implementation. Conclusions of the substantive divisions: 1) Upper Volta market is restricted and market has to be analyzed to include adjacent countries. 2) Problem cannot be finished until a new/well with better quality and a constant flow of table water has been located. 3) Approximate size of the plant corresponds to the expected market demand and a bottling plant as proposed represents a good investment provided the conditions under (2) are met.

- Letter Resident Representative, UNDP/Maneck dated 8/1/1974: Conclusions and recommendations of the report are unclear. Main question left open: is the Dinderosso water safe to drink or not, and in the latter case, can it be treated so as to make it safe?

Report of Dr. P. Saliou, Biological Section Centre Muraz, Upper Volta dated 24/12/1973. Physico-chemical analysis: satisfactory, bacteriological analysis: non negligible presence of fecal streptococques; it is not sure whether the source is contaminated (not probable) or whether the water is contaminated at the emergence of the source.

- Cable misc 210 Resident Representative UNDP/Maneck: Comments by UNIDO substantive division transmitted to Government. On receipt of report, the latter will also be submitted to the Upper Volta authorities. No other follow up action since.

Inventory of Feasibility Studies

03338

Country: Ethiopia (ETH)

Industrial Sector : Food Industry (31.7.C)

Serial Number : 33

Classification: 77/33/01/ETH/31.7.C/P/Tomato paste

Title of study: A feasibility study of the establishment of Tomato Paste Production in Ethiopia (IS/ETH/71/801)

Date of study : March 1972

Author of study: Erik Kissmeyer - Nielsen

Sponsoring Agency : UNIDO, Government

1. Description:

The study analyses the establishment of a competitive export oriented tomato processing industry with emphasis on tomato paste for both export and domestic markets. Ethiopia has particularly favourable conditions for production of high quality, low cost tomatoes for processing; the Mid Awash Valley and particularly the Metahara area will be the most suitable area for a tomato processing plant. There exist sizable Middle East and East African markets. Future opportunities would be markets in Western Europe and North America and to some extent Japan. One of the main problems to sell the products on world market at competitive prices is the problem of cans. Nearly all litographed cans are imported from Italy and increase by 100% from the f.o.b. Italian port price. This renders Ethiopian tomato producers unable to compete on the world market. It is suggested to erect a tomato processing plant with a proposed capacity of 36,000 t/y of fresh potatoes. This will give 5,800 t/y of triple strength tomato paste packed in 5 kg gross tin cans for reprocessing. The investment of such a plant would amount to 5,772,000 Et. \$.

2. Recommendations:

- Well controlled trial productions of tomatoes for producing tomato paste must be carried out near the location for the projected tomato processing plant. This may take up to 3 years in order to reach 'conclusive' results.
- .. Market outlets must be created for production prior to erection of the plant. It is recommended that qualified international processors and marketers of food products are presented with the opportunity to develop a tomato paste production in Ethiopia.
- .. Set up of own can production and testing facilities which eliminates the costs of transport of bulky cans.
- Solid waste should be used for animal feed.
- 600 ha of tomatoes should be grown annually to guarantee the 36,000 t/y of tomatoes.
- It will be advisable, at least initially to plan to market tomato paste for the world market manufactured in Ethiopia in larger ~~xx~~ size cans for reprocessing.

3. Financial Returns:

At full capacity the annual sales revenues will amount to 4,155,000 Et. \$, annual production costs to 2,917,000 Et. \$ and annual net profit to 1,238,000 Et. \$. After analysis of the new projected cash flow chart sent by letter dated 19-4-1972 a D.C.F. rate of about 14.7% was calculated.

4. Economical benefits:

The creation of a large scale, modern tomato processing plant and tomato production will first serve as a much needed source of foreign exchange. It will stabilize and improve the domestic production of cardboard boxes and tin cans; the external economies will thus be significant. It will create much needed new jobs for Ethiopian labour and by introducing more efficient processing and production methods it will serve as an example to the food processing industry as well as the vegetable production industry.

5. Follow up actions:

- Memo Mautner/Maneck dated 13-4-1972 : The idea of establishing the tomato processing plant should be followed up, since it is a sound one. The experts concept and approach are rational. However, his calculations are all very optimistic. Comments should be submitted to expert in order to obtain his views. The study should be sub-mitted to government with substantive Division's comments. Government should contact investors and invite them to make joint ventures.
- Letter Kissmeyer-Nielsen/Maneck dated 29-4-1972 : The expert is defending his standpoint. Relevant evidence papers attached.
- Memo Mautner/Maneck dated 12-5-1972 : Answers by expert to queries are satisfactory.
- Memo Mautner/Maneck dated 13-7-1972: UNIDO offered assistance in locating international enterprises interested in a joint venture. Res.Rep. replied that project seems to be a viable one and that trials are being made on the production of suitable raw materials. It seems that Res. Rep. wants to wait for more positive results in this raw material production, previous to entering into the question of industrial project and joint ventures. Res. Rep. has promised to keep UNIDO informed.
- Letter K. Olsen, FAO/Saunders, UNDP dated 14-8-1972: FAO is sceptical about the project and suggests that another feasibility study be made.
- Letter Quijano-Caballero/K.. Olsen, FAO dated 14-9-1972: Government of Ethiopia, Res.Rep. and UNIDO are aware of the basic constraints against developing a modern tomato processing industry. A new feasibility study could not add anything to what was already pointed out. Ethiopia's need at this stage is to grow tomatoes along modern lines and to find possible international enterprises which would join them in this project.
- Discussion with Mr. Moreira-Dias dated 10-11-1977 : No follow up action since.

Inventory of Feasibility Studies

03339

Country: Burundi (BDI)

Industrial Sector : Pesticides (32.1.G)

Serial Number : 34

Classification: 77/34/01/BDI/32.1.G/P

Title of study: Etude de préinvestissement sur une usine de production de pesticides agricoles au Burundi et sur l'ouverture d'une carrière de Kaolin (IS/BDI/74/003)

Date of study : March 1975

Author of Study : F.Cano (UNIDO), M.Kacjan (UNIDO), P.Ene (Assistance Technique Roumaine), D.Barumpozako (Ministère de l'Economie et des Finance, Burundi)

Sponsoring agency : UNIDO, Government

1. Description

The import of pesticides plays an important role in ^{the} budget of Agriculture. These imports involve a great quantity of Kaolin which transport costs represents 33% of the annual imported pesticides. Therefore the Kaolin deposits of Kayanza should be exploited and used as mineral support of the active material which was to be imported. The annual imports of active materials would then only be 1.4 t/y of HCH, 220 t/y of DDT, 74 t/y of Malathion and 17 t/y of Microcel.

An yearly production capacity of 2,255 tons of insecticides should be foreseen: 1200 t/y of powder for dry powdering (10% DDT, 5.45% Malathion 100%), 55 t/y of powder for dry powdering (2.5% HCH) and 1000 t/y of powder for dry powdering (10% DDT). From the latter it was assumed that additional 1000 t/y could be exported; 900 t/y to Rwanda and 100 t/y to the Kivu market (Zaire). The kaolin deposits of Kayanza at an annual production of 3000 t/y could be exploited between 32 and 58 years, depending upon the assumptions on existing reserves.

2. Recommendations

- The best location to establish the factory for pesticides production would be Bujumbura as this location is the best suited for distribution of pesticides. The existing infrastructure would also help to reduce production costs, especially electricity costs.
- A flexible production line with a capacity of about 3000 t/y should be set up. The production should be simple, not too automatized and could also produce other insecticides not yet utilized such as fungicides and herbicides.
- DDT powder and Malathion, though very efficient, could lose efficiency as more and more insect populations become resistant. Therefore other alternatives of insecticides should be foreseen, which would take about two years of testing.

3. Financial returns

Investment costs amount to 35,690,000 FBU, annual production costs amount to 37,376,495 FBU., annual sales revenues will be 46,376,495 FBU. and the annual benefit will be 9,000,000 FBU. The annual return on investment will be 30%.

4. Economical benefits

- The new industry will be highly import substituting and will bring a positive balance of foreign currencies of 240,000,000 FBU. in 7 years.
- The value added of the new factory will be 14,902,023 FBU.
- The economies for natural agriculture will amount to 15,125,000 FBU.
- 68 new jobs will be created by establishing the new industry creating a gross income of 2,768,000 FBU.

5. Follow up action

Project implemented.

Letter Rwasa, President of the Board of Directors of Company/Szabo dated 15-9-1977 : The last annual production has been 1,100 t/y of insecticides, 10% DDT and 5% Malathion and 170 t/y with 3% Folithion.

Inventory of Feasibility Studies

Country : Ethiopia (ETH)

Industrial Sector : Leather and Leather products Industry (31.7.D)

Serial Number: 35

Classification : 77/35/01/ETH/31.7.D/P/Leather Garments

Title of study : Proposal for the establishment of a leather garment
Factory in Ethiopia (IS/ETH/73/015)

Date of study : 1975

Author of study: R.F. Ledger and K. Trčka

Sponsoring agency : UNIDO, Government

1. Description

Industrial production of leather garment has not yet been introduced in Ethiopia. Climatic conditions and the demand on the Ethiopian market could favour this production. The abounding supplies of raw hides and skins in Ethiopia and the regular production of medium priced garment leather in Ethiopian tanneries are a sound basis for the development of a serious industrial production of leather garments in Ethiopia. The establishment of a leather garment industry in Ethiopia is not a costly and complicated proposal. Building is simple, the machinery is not expensive and Ethiopian workmen will easily master the technique of production. Export of leather garments should be organized as well. All the developed countries in Europe and the United States import leather garments regularly as the demand in these countries cannot be covered by their own production. A leather garment factory should therefore be established producing at full capacity (3rd year) 12,000 men's jackets, 3,000 men's zippers, 1,500 men's long coats, 12,000 ladies jackets and 1,500 ladies coats. Half of the production is to be exported. The total investment costs would amount to Eth \$713,048.

2. Recommendations

- The prosperity and growth of leather garment industry in Ethiopia depend on two basic conditions : (a) the production and regular supply of good quality cheap garment leather and (b) the development of the export of leather garments. To promote the styling and marketing, especially the export of leather garment, the assistance of UNIDO experts are anticipated.
- It is essential to establish and manage an up-to-date model cutting department, market research and export organization. Aggressive and skillful agents should be appointed for important markets and customers.
- As successful sales of leather garments are closely connected with the trend of fashion, the management of the leather garment factory should follow up the trend of fashion by visiting fashion shows and specialised fairs abroad, and by subscribing the most important fashion magazines.

3. Financial returns

From the sixth year onwards the annual sales revenues will be Eth.\$2,263,934, the annual production cost will be Eth.\$ 1,993,692 and the annual profit will be Eth.\$ 270,242. No indications in the study concerning the financial returns.

4. Economical benefits

- The new industry would be highly import-substituting as all the hides and skins processed would be bought from Ethiopian tanneries.
- The sales value at full production of the exported leather garments would amount to Eth.\$ 1,150,903 per year.
- The annual value added would amount to Eth. \$ 642,634, Eth.\$ 343,068 of which are generated by production for the Ethiopian market, Eth.\$ 299,566 by export production.
- The new industry would create 105 new jobs creating a gross income of Eth. \$ 305,520 from the second production year onwards..

5. Follow up action

- Memo Miklcovicz/Manek dated 14-10-1975 : Mr. Trčka's report is carefully elaborated but Mr. Ledger's technical part of the feasibility study is too sketchy. Suggestion to Ethiopian government should be made that a specialist in the leather garment industry should be sent to Ethiopia, that this specialist should advise the government on the subject matter, based on the above two reports and that the expert should complement the study with uptodate and more detailed information. Such a specialised mission would be needed before a well elaborated feasibility study for a leather garment factory can be submitted to the Government.
- Letter Selassie Yosiet, Finance and Credit Department of Planning Commission/Res. Rep. dated 20-1-1977 : Government requests a UNIDO Expert in leather garments manufacture to review and update previous study.
- PDS for a leather garment expert issued and signed on 16-3-1977 by Mr. Siddiqui (Project Number SI/ETH/77/801).
- Recruitment action started. Two experts submitted to Government. This is the status of project as of August 1977.
- No other information in the Registry file.

Inventory of Feasibility Studies

Country : Asia Regional (RAS) : Laos, Thailand, Khmer Republic, Republic of Vietnam

Industrial Sector : Fertilizers (32.1.F)

Serial Number : 36

Classification: 77/05/02/RAS/32.1.F/F/Phosphoric acid

Title of study: Feasibility report on furnace phosphoric acid industry in Lower Mekong Basin (DP/RAS/72/123)

Date of study : September 1974

Author of study : Dastur Engineering International GmbH, Dusseldorf, FRG

Sponsoring agency : UNIDO, ECAFE

1. Description

Phosphoric acid is used primarily for the production of a wide variety of phosphate fertilizers and to a limited extent in production of detergents, pharmaceuticals as well as for surface treatment of metals. In view of the anticipated availability of abundant and cheap hydro-electric power in the region, adoption of the electro-thermal process for the production of furnace phosphoric acid is advisable. The expected domestic demand for the production for the region would be 530,000 t/y in 1985; possible exports to Sri Lanka, Indonesia, Malaysia, Pakistan and the Philippines of 20 to 25,000 t/y in 1985 were assumed. Phosphate rocks, the main raw material has to be imported. A preselection of possible plant locations identified Sirada (Sri Lanka), Kompong Som (Khmer Republic), Yung Tan and Danang (Vietnam), Vientiane (Laos) as feasible. Laos is the most favourably placed with respect of power supply and prices. The layout and financial calculations for a hypothetical plant were established, this plant was to produce 200,000 t/y of phosphoric acid in the form of 80% acid. The total investment costs of such a plant would be about \$ 52,900,000 including a working capital of \$ 10,400,000.

2. Recommendations

- The priority of the project in the light of national benefits should be determined and the necessary economic concessions (customs duty exemption, tax holidays etc.) should be obtained.
- Prospective sources of supply of phosphate rocks need to be identified and supplies on a long-term basis should be negotiated. Concurrently investigations and tests on local phosphate rock should be taken, with a view to establishing the possibilities of using local ore at a later date.
- In view of the heavy dependance of the furnace phosphoric acid industry on electric power, it is imperative that the various hydro-electric projects be implemented as planned so that adequate power is available for the proposed project.
- Detailed geological investigations should be carried out to establish the availability and quality of quartzite in the region.

- A detailed feasibility study should be initiated to review possible plant locations, to examine infrastructure facilities and make firm estimates of capital requirement keeping in view the indigenous manufacturing capacity available in each of the four countries.
- A phased recruitment and training of personnel required for operation and maintenance of the plant would be necessary. Smelting furnaces proposed for this study are of large capacity which would require high levels of skills. It may be worthwhile to establish in the first instance a smaller smelting furnace, say to produce ferro-silicom in the region. This plant could be set up in Laos and the locally available quartzite and surplus electrical power from the Nam Ngum project be utilized. Scrap, required in small quantities, would be available in the neighbourhood.

3. Financial returns

Net annual sales revenues at full production will be \$47,700,000, annual production costs will fall from \$ 50,017,000 (year 3) to \$ 43,530,000 (year 20). The first 10 years will bring losses. In year 20 of production the net profit will be \$ 4,170,000 and a cumulative net benefit after 20 years will be \$ 9,328,000. The rate of return of net profit before tax to total fixed investment (42,500,000) in year 20 will be 9.8%.

4. Economical benefits

The main economical benefit would be create 550 new jobs per production unit of 200,000 t/y of phosphoric acid; this would create \$ 300,000 gross income per year including 50% (\$263,250) of fringe benefits.

In case of prospection and exploitation of phosphate rock deposits in the region, the new industry would be highly import substituting and would have a positive effect on the balance on payments.

5. Follow up action

- Memo Verghese/Newton dated 9-10-1974 : Report favourably evaluated by substantive division.
- Memo Verghese/Rothblum dated 10-10-1974 : Comments on the report : It seems to be optimistic that plant will reach 90% of capacity in year 2 and 100% in year 3. Financing of project may run into difficulties as plant will only be profitable after 10 years operation, as project is extremely sensitive to import prices of phosphate rock and other raw materials required. Unless long term contracts at reasonable costs can be obtained, the viability of the project is highly questionable. The Mekong committee might well be advised to initiate a study for erection of nitrogen production facility (ammonia/urea plant) based on electrolytic hydrogen as feedstock for ammonia, as such a plant would not require importation of any basic raw materials.
- Letter I.S.Macarpas, ECAFE/Siddiqui dated 4-12-1974 : Feasibility study will be re-examined by Mekong Committee. Question whether UNIDO might have recent studies in the manufacture of ammonia/urea by the electrolytic process.

- Letter Becker-Boost/Carmignani, IBRD dated 9-1-1975 : If World Bank is interested in such a project, could there be any possible investment follow up activities?
- Letter C.J. Pratt, IBRD/Becker-Boost dated 31-1-1975 : As profitability would only commence in the eleventh year of operation, the Bank would probably not be interested in financing such a project, but the Bank does not know the specific assumptions made in the report. IBRD will appreciate UNIDO sending a copy of report for review.
- No other relevant follow up action in the Registry file.

Country : Pakistan (PAK)

Industrial Sector : Electrical machinery and electronic equipment (31.9.C)

Serial Number : 37

Classification: 77/37/02/PAK/31.9.C/F/Broadcasting Equipment

Title of study: Broadcasting equipment manufacturing - Feasibility Study (DP/PAK/73/040)

Date of study : May 1975

Author of study : J. Prazak and R.El-Hadidi

Sponsoring agency : UNIDO, Government, Pakistan Broadcasting Corporation (PBC)

1. Description

The study analyses the economical situation of the whole Pakistan electronic industries with an impact on electronic industries for broadcasting, television and telephone equipment. The conclusion concerning electronic equipment manufacturing for broadcasting is that the local electronics industry is not in a position to manufacture required equipments but is in a position to supply some parts and components used in these equipments. As for transmitting tubes manufacturing, although not feasible from an economical point of view, the project needs to be examined, in terms of invisible benefits and long range gains. TV-picture tube manufacturing should be considered as demand for TV sets is increasing. Special attention is to be given to cathode rays tubes manufacturing, development of lead glass production and production of transmitting tubes in a TV picture tube plant. Investment of a transmitting and studio equipment project would be Rs.2,855,000 including working capital of Rs.920,000. Transmitting tubes (transmission valves) project would need Rs.1,715,000 for investment including Rs.240,000 for working capital.

2. Recommendations

- More care about quality of the products is needed. This can be controlled by a governmental quality control centre.
- There is need of more co-operation and co-ordination within electronic industry, industrial organization has to be adhered in the production, there is need of standardization of components, circuits.
- Engineering education should be more practical and research oriented and there is a requirement of a large number of managers, scientists and engineers.
- The number of technicians needs to be doubled and more care has to be given to polytechnical and similar education.
- There is need for electronic research and development centre.
- An authorized board of electronics should be set up assisted by UNIDO expert to promote the electronics industry (Planning, coordination, follow up and development)

3. Financial returns

The transmitting and studio equipment project would bring annual sales revenues of 3,150,000 rupees, annual production costs of Rs.4,483,000 and an annual loss of Rs.2,820,000.

The transmitting tubes project would bring annual sales revenues of Rs.975,000, annual production costs of Rs.2,534,000 and an annual loss of Rs. 2,909,000.

4. Economical benefits

- The transmitting and studio equipment project would create 42 new employments and induce an additional income of Rs.880,000 in 1981-82. The transmitting tubes project would create 44 new employments and induce an additional income of Rs.954,000.
- The development and production activity generated by the development of electronic industries will be valuable. This development activity will pay dividends at a later date in terms of economic and technological progress although no immediate profits may be forthcoming.

5. Follow up action

- Note to the file of Mr. Yamamoto dated 13-8-1975 : Debriefing of Mr. El Hadidy, summary of recommendations : establishment of a Design Development Department for Broadcasting equipment which could cover a pilot plant. UNIDO's assistance would be needed. For the time being it is not feasible to manufacture transmitting tubes. The above points should be connected with the broadcasting organizations of developing countries, since the market will be larger than that of Pakistan. Standardization of transmitting tubes is very important and for this matter UNIDO's assistance may be necessary. To establish and develop the electronic industry, especially TV picture tube, Pakistan will need UNIDO's assistance (minimum one expert for one year). Mr. S.I.H. Zaidi, Director-General, Radio Pakistan praised the work of the expert.
- Letter Recd. Dep./H.Z.Iqbal, Deputy Secretary of Economic Affairs Division Islamabad dated 26-9-1975 : Final reports of Mr. J. Prazak and Mr. R. El Hadidy are transmitted to government with the endorsement of UNIDO.
- No other relevant follow up action in Registry file.

Inventory of feasibility studies

03343

Country : Madagascar (MAG)

Industrial Sector : Food industry (31.7.C)

Serial Number : 38

Classification: 77/38/01/MAG/31.7.C/P/Biscuits

Title of study: Expansion and extension programme of the sweets and biscuits society "SOCOBIS", Tananarive, Madagascar.
(IS/MAG/72/015) Unido doc UNIDO/TCD 211

Date of study : 9 July 1973

Author of study : E. Zachmann

Sponsoring agency : UNIDO, Government

1. Description

The purpose of the study is to establish an extension programme of the state owned biscuit society "SOCOBIS", founded in 1967. For this purpose a general planning is done for the transfer of the old factory to an industrial zone with all the necessary equipments, products calculations, recipes for the end products. The study foresees a short, medium and long term. The short term project (1973-74) foresees production of lozenges and chewing gum at investment costs of 36,000,000 FMG. The medium term project will realize the renewal of the equipment of the biscuit production unit and the installation of a waffle production unit and of a candies production unit, the installation of equipment for the cooking of caramel and the set up of silos for sugar and glucose. The investment costs for the medium term project will be 340,500,000 FMG. The long term project (1975-76) foresees the establishment of a chocolate production unit, a bananas treatment unit and a glucose processing unit at investment costs of 448,500,000 FMG.

2. Recommendations

- To realize the objectives of the study for the extension, the indicated timing and the proposed development should be followed in view of attaining the indicated turn over, to accomplish amortization in time and to reduce imports as soon as possible. The indicated timing will permit the intended expansion and will guarantee the delivery of new products without concurrence.
- When financing of the extension is approved, an international expert or industrial consultant with solid experience in sweets, biscuits, chocolate and waffles production should be hired for six months first to make the ordering of machines and to participate in the set up of the building and in the installation of equipment. A three month mission is needed later on to help in the start up of production.

3. Financial returns

After completion of the short, medium and long term projects, the annual sales revenues will be 1,295,000,000 FMG in 1977. Net profit in 1979 will then be 110,125,000 FMG and the return on sales revenues will be 8.5%.

4. Economical benefits

- The expansion of the existing production unit will create about 150 new employment at the factory. 300 additional employments will be created in the manioc plantations and for the production of starch and glucose.
- It is assumed that 30% of total production can be exported in 1979 bringing sales revenues of 376,000,000 F.M.G. Besides of import substitution, this would have another positive effect on the balance of payments of the country.

5. Follow up action

The letter of the Foreign Ministry of Madagascar to the Res. Rep. dated 7-8-1975 confirms that the project has been implemented following the recommendations of Mr.Zachmann. The production line for lozenges was installed and functions since July 1974, chewing gum manufacturing has started and first products have been sold in May 1975. Glucose production is under discussion, chocolate manufacturing is intended to be realized at the end of the decade.

Country : Regional (REG) RCD Countries : Turkey, Iran, Pakistan

Industrial Sector : Machinery (31.9.B)

Serial Number : 39

Classification: 77/39/02/04/REG/31.9.B/F/Hydraulic turbines

Title of study: A feasibility study on the manufacturing industry for hydraulic turbines and coupling systems in RCD countries

Date of study : 18 May 1970

Author of study : ENSA (Energy, Industrial and Engineering Consultants),
Ankara, Turkey

Sponsoring agency : Prime Ministry, State Planning Organization of Turkey.

1. Description

The main purpose of the study is to explore and develop the energy supply means of the RCD countries i.e. Turkey, Iran and Pakistan. The most economic way of energy production at present is the utilization of hydro-sources. Therefore manufacture of hydraulic turbines to meet the requirements of the RCD countries could serve as a starting point in this direction. A yearly capacity of six 270,000 HP turbines, 6000 t/y, 15 to 20 gates and valves, 1500 t/y and penstock and steel lining for tunnels of 2000 t/y at investment costs of \$ 12,875,000 in local and \$ 6,090,000 in foreign currency, total investment costs \$ 18,965,000 including working capital of \$ 5,200,000 would be needed. If an annual production of six 200 MW hydro-alternators of 7,200 t/y is added, the investment costs would only rise to \$ 16,480,000 in local currency and \$ 7,875,000 in foreign currency, total investment costs \$ 24,355,000. The working capital would be then \$ 6,600,000 of which \$ 4,650,000 will be needed in local currency and \$ 1,950,000 in foreign currency. Some other advantages for the production of hydraulic turbines and alternators in the RCD countries would be: at least 10 years sales guarantees, the possibility of purchasing modern machinery at a reasonable low price from certain European turbine manufacturers which are in the process of closing down, the possibility of manufacturing in the same plant the gates, valves, pressure pipes etc. required for the hydro power stations as well as pumps, pressure vessels and other similar products for which there is a substantial demand in the RCD countries. Many European firms would be ready to participate or provide credit towards various supplies.

2. Recommendations

- In view of the size of the demand, the hydraulic power potentials availability of the raw materials, labour CIF costs and the status of the basic and ancillary industries, it is recommended that the project should be located in Turkey.
- The installation and the bringing into operation of the factory at full capacity will take four years. Therefore, the partners should come together and decide upon its installation as soon as possible.
- Requirement for the medium size hydraulic turbines (500 HP - 10,000 HP) is just a few, so that it is not recommended to establish a separate

manufacturing industry for this.

- Meeting the demands of the region for the small hydraulic turbines (1 HP - 500 HP) can be accomplished by encouraging the expansion of the already existing industry in the member countries.

3. Financial returns

Producing only turbines and accessories, the annual sales income would be \$ 8,500,000, annual products costs would be \$ 6,925,000 and annual gross profit would be \$ 1,575,000. In this case, return on investment with customs duty would be 8.32%, return on investment without customs duty would be 9.32%.

The complete production line including turbines, accessories and hydro-alternators would bring annual sales income of \$ 15,700,000, annual production costs of \$ 11,835,000 and annual gross benefit of \$ 3,865,000. The return on investment would then be 15.9% with customs duty and 17.8% without customs duty.

4. Economical benefits

- The project will have a great impact on the unemployment problem of the region as turbine manufacturing would create 698 new jobs in the factory inducing an additional income of \$ 1,900,000; the complete production line including production of hydro-alternators would create 1040 new jobs, the additional income would then be \$ 3,070,000. By the creation of the factory, other industries in the region would be promoted such as transport and electricity. This again will open up some 5 - 10 thousand new employment possibilities in the member countries.
- The contribution to national income would be \$ 4,495,000 for the turbine production and \$ 8,350,000 for the complete production line. These figures include already the above mentioned additional income.
- The investment cost of \$ 24,355,000 will be in use due to installations. The usage of such an amount of money will be beneficial for social development, government's income, side industry and total commercial life.
- The products, only foreseen to be sold in the region would yield a foreign currency gain in terms of import substitution of \$ 13,200,000 annual net savings. Considering total amount of foreign currency requirement of \$ 7,875,000 it will be possible to recover this amount even in the first year.

5. Follow up action

As the feasibility study has not been done for UNIDO, it is not known whether the project has been implemented.

Inventory of Feasibility Studies

003345

Country : Sri Lanka (SRL)

Industrial Sector : Light non-ferrous metals (31.8.A)

Serial Number : 40

Classification: 77/40/02/SRL/31.8.A/F/Ilmenite sand

Title of study: Techno-economical feasibility study on smelting of Titanium slags (DP/SRL/74/032)

Date of study : 1972

Author of study : Tsvetmetpromexport, USSR

Sponsoring agency : UNIDO, Government

1. Description

The study analyses different possibilities of establishing a pilot plant for electrosmelting in Sri Lanka in several variations. The first alternative is the side location; the investigation in the study analyses possible plant location in the area of Pulmoddai and in the area of Trincomalee. As for the concentration of Titania-rich slag, a concentration of 90% TiO₂ (version A) and a concentration of 82% of TiO₂ (version B) is examined, the different reducing agents like anthracite, charcoal calculated. Investment costs for the pilot plant in the area of Pulmoddai would be 46,000,000 rupees including working capital; for the pilot plant in the area of Trincomalee, the investment costs would be 37,000,000 rupees. The study analyses then the alternative of a 4 furnaces industrial plant with charcoal as a reducing agent; investment would then be Rs.100,000,000. A last alternative was then calculated upon request from UNIDO for a two furnaces industrial plant with wood charcoal as a reducing agent. For version "A" the raw materials needed would be 41,200 tons of ilmenite concentrates, 6160 tons of reducing agent and 660 tons of graphite electrodes. 22,300 tons of slag and 12,000 tons of pig iron would be produced. Investment cost would be 51,000,000 rupees. For version "B", the raw materials needed would be 48,000 tons of ilmenite concentrates, 5520 tons of reducing agent and 660 tons of graphite electrodes. Investment costs would be Rs.51,000,000.

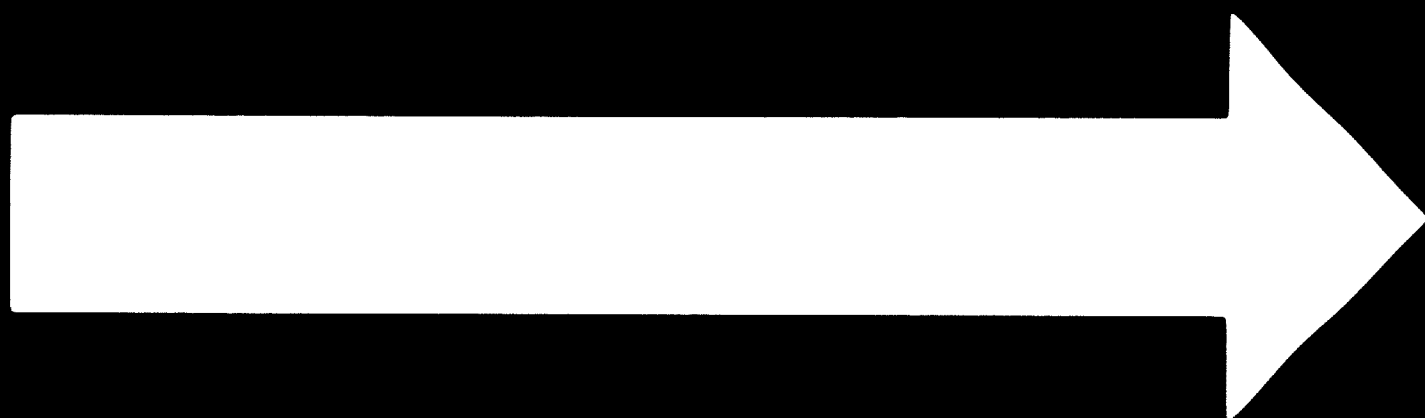
2. Recommendations

The pilot plant stage should be omitted and instead industrial scale trial-adjustment of the Soviet technology to Sri Lanka local raw materials, first of all charcoal should be made in an operating industrial plant. In a positive case, an industrial scale operation with an industrial capacity of four furnaces should be established. UNIDO's idea is a two-furnaces starting industrial capacity instead. This is justified by uncertainties concerning proven reserves of ilmenite, by usual limitations in investment capital available and by some caution required when entering the world market with a new product.

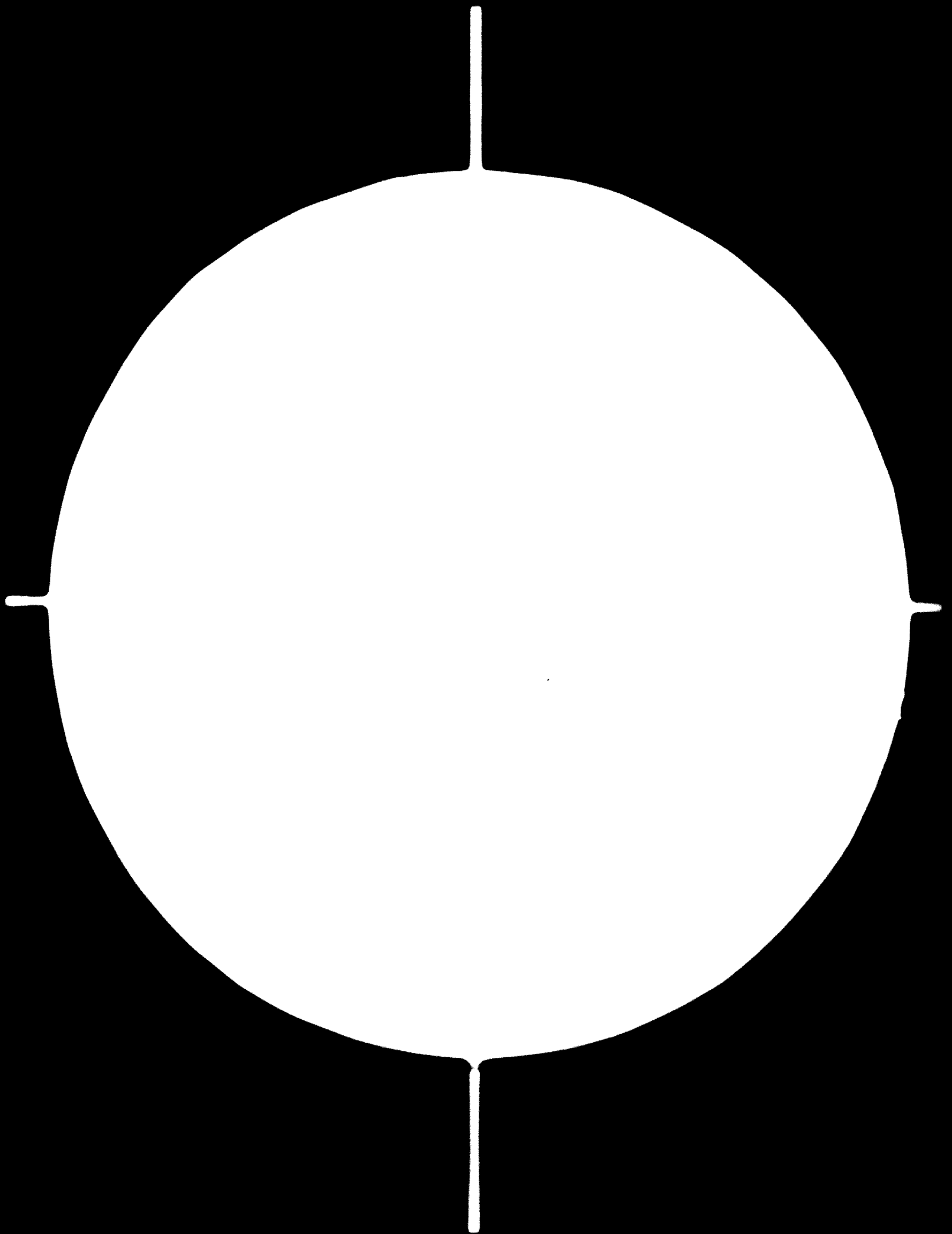
3. Financial returns

Version "A" of a two-furnace capacity industrial plant would bring annual sales revenues of Rs.32,700,000; annual production costs would be Rs.25,957,000 and annual profit would be Rs.6,749,000. The break even period would be approximately 7 - 6 years. Version "B" of above mentioned plant would bring

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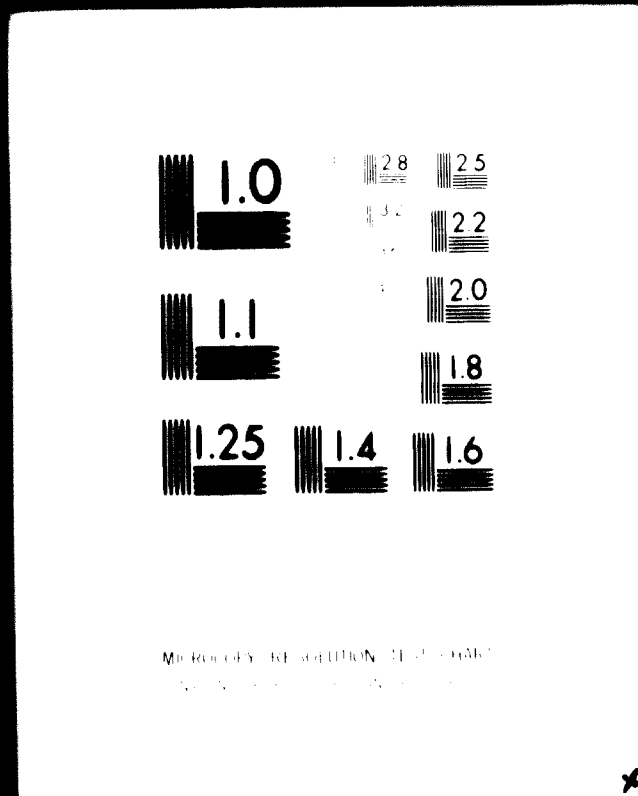
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annual sales revenues of Rs.33,384,000; annual production cost would be Rs. 26,377,000 and annual profit would be Rs.7,007,000. The break even period would be approximately 7 - 2 years.

4. Economical benefits

- The plant would create a considerable amount of new jobs and induce an additional income of Es. 1,097,000 per year.
- Implementation of the project would permit to use local raw materials like Ilmenite and charcoal. Production of pig iron and titanium slag would be on one hand import substituting, on the other hand the exports would bring gains in foreign currencies, having thus a positive effect on the balance of payments of the country.

5. Follow up action

The report of a follow up and negotiations mission to Sri Lanka by E.T. Balasz of January 1974 states that the Government of Sri Lanka took the decision to omit the pilot stage and to proceed directly with the preparation of establishing an industrial scale plant for electro-smelting ilmenite concentrates in the country. However, it would be necessary as a pre-condition to carry out an industrial scale smelting run of 1200 tons of ilmenite concentrates with 300 tons of charcoal and further the results obtained should be positive. Project DP/SRL/74/032 was established to undergo the above trial runs in USSR. The report on the results of the trial runs, performed in USSR, was completed by Tsvetmetpromexport, All-Union Research and Design Titanium Institute in 1976 : "Smelting of Titanium slags of raw materials from Sri Lanka". The evaluation report of IOD concludes that the test's results, as reflected in the report are technically positive and very valuable. Another pre-requisite should be an updated economic evaluation which takes into account such factors as : recent data on mineral reserves; actual and forecast investment costs, updated production costs factors, potential of electric energy and other utilities supply, timing of their availability, possible infrastructural investments. The report on the test runs and above comments of IOD were transmitted to Res. Rep. UNDP on 7-5-1976.

Not. for the file of Mr. Szakal dated 30-9-1976 : Discussion with Mr. Auslan of the Australian Embassy and Mr. Benson, Managing Director of Associated Business Consultants Ltd., Sydney. The visitors were interested to hear on the general outlines of the ilmenite project in Sri Lanka also with a special view to possible Australian participation. It was advised that detailed information and a possible insight into the final report can be obtained from the Government.

Letter Napoliello/Res.Rep. dated 13-10-1976 : Whichever the decision of the Government, UNIDO thinks that some external assistance is required for the following stages (a) consultancy in the pre-investment stage (b) consultancy in the design stage, and (c) consultancy and training in the stage of plant construction and commissioning.

Letter Veliky/Res.Rep. dated 31-5-1977 : UNIDO would be grateful if informed about any possible follow up technical assistance activity. Technical assistance could usefully complement bilateral action by training and consultancy in construction management.

Letter Res. ep./Veliky dated 13-6-1977 : Res. Rep. will keep UNIDO advised as to future action regarding the construction of an ilmenite concentrate processing plant.

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Inventory of feasibility studies

Country : Tunisia (TUN)

Industrial Sector : Cement and concrete products industry (32.1.A)
See also : Basic Chemicals (32.1.C)

Serial Number : 41a

Classification: 77/41a/01/TUN/32.1.A/P/Cement

Title of study: Production of sulphuric acid and of cement from
Phosphogypsum (DF/TUN/72/005)

Date of study : 1975

Author of study : S. Klinghoffer

Sponsoring agency : UNIDO, International Centre for Industrial Studies (CNEI)

1. Description

The study analyses the production of sulphuric acid and cement from phosphogypsum, which is a residual of phosphoric acid production. This would on one hand make independent phosphoric acid production from sulphur and its price fluctuations on the international market, as sulphur has to be entirely imported. On the other hand there exists already a waste disposal of 8 million tons of phosphogypsum at the Stax plant whereas the Gabès factory is pouring now 3,000 tons per day into the sea. For the production, the "Müller-Kühne" process is foreseen, this process giving one ton of sulphuric acid for one ton of cement. The production capacity of the plant is assumed to produce 100,000 tons of sulphuric acid and 100,000 t/y of cement in the first production year, 230,000 t/y of sulphuric acid and 230,000 tons of cement in the second year and producing at full capacity of 320,000 t/y of sulphuric acid and 320,000 tons per year of cement. Investment costs of the project would be DT 26,980,000 of which DT 19,600,000 would be needed in foreign currencies. These investment costs include DT 600,000 for working capital of which DT 391,000 would be in foreign currencies.

2. Recommendations

- As long as the cement price in Tunisia is not set free, the project cannot be feasible without substantial subventions. These subventions can be conceived under the form of an equalizing tax on imported cement, which price is much higher than the price fixed by the Tunisian authorities. For a newly established factory, this tax would loose its justification as locally produced cement will replace ton by ton the imported cement. A production tax exemption for several years could also be envisaged.
- The factory is only profitable due to cement production.
- Financing should not be done solely by long terms loans but at least one third should be financed through subscription.
- The Tunisian authorities should conclude long term agreements with coke producing countries like Yugoslavia and could then get the imported coal at a better price than the one used in the study.

3. Financial returns

Assuming a selling price of 14 DT/t for sulphuric acid and 7.208 DT/t for cement the annual sales revenues would be DT 6,999,000, annual production costs would be DT 5,237,000 and annual benefits excluding amortization and taxes would be DT 1,762,000. Annual amortization being assumed at DT 2,450,000 there would be an annual loss of DT 698,000.

If a tax exemption could be obtained on cement of 6 DT/t, its selling price being then 13.208 DT/t, the annual sales revenues would be DT 8,979,000, annual production costs would be DT 5,237,000, annual profit before amortization and tax would be DT 3,742,000 and annual profit before tax would be DT 1,282,000. The internal rate of return (DCF rate) would then be 5.15%.

4. Economical benefits

- The import substitution of sulphur needed to produce 330,000 t/y of sulphuric acid, taking into account the additional coke needed for the process would bring an annual saving of foreign currencies of DT 760,000. The import substitution of 330,000 t/y locally produced cement would save DT 5,000,000 of foreign currencies per year.
- The project would create 150 new employment possibilities generating thus an additional income of DT 330,000.

5. Follow up action

- Letter Schroll, Project Manager from Project DP/TUN/72/005/Maneck dated 8-9-1975 : Copy of study sent to UNIDO.
- Letter Schroll/Maneck dated 8-10-1975 : CNEI would like to send a Tunisian chemical engineer for a short instruction course to the Chemie-Linz AG, Austria to study the Müller-Kühne process adapted to Phosphogypsum.
- Letter May/Stich, Chemie-Linz AG dated 15-12-1975 : Mr. Zemaidé from Tunisia will come to visit Chemie-Linz AG on a fellowship basis from 12/1/1976.
- Return of Mr. Klinghoffer to Tunisia in October 1975 to update and expand the work completed in 1975 on the above project. He will complete the techno-economic study on the production of cement from by-product phosphogypsum and take into account the value of recoverable sulphur dioxide for the production of sulphuric acid in existing sulphuric acid plants at Gabès and Sfax. He will investigate alternative uses of by-product phosphogypsum for building blocks and panel boards and the production of plaster.
- Cable misc 766 Res.Rep/Veliky dated 29-7-1977: Expert still in the field in order to finish and discuss his report. The expert will leave on 6 August.

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Inventory of Feasibility Studies

Country : Tunisia (TUN)

Industrial Sector : Basic Chemicals (32.1.C)

See also : Cement and Concrete products industry (32.1.A)

Serial Number: 41b

Classification : 77/41b/01/TUN/31.1.C/P/Sulphuric acid

Title of study : Production of Sulphuric acid and of cement from phosphogypsum (DP/TUN/72/005)

Date of study : 1975

Author of study : S. Klinghoffer

Sponsoring Agency : UNIDO, International Centre for Industrial Studies (CIMEI)

1. Description

The study analyses the production of sulphuric acid and cement from phosphogypsum, which is a residual of phosphoric acid production. This would on one hand make independent phosphoric acid production from sulphur and its price fluctuations on the international market, as sulphur has to be entirely imported. On the other hand there exists already a waste disposal of 8 million tons of phosphogypsum at the Stax plant whereas the Gabin factory is pouring now 3,000 tons per day into the sea. For the production, the "Müller-Kühne" process is foreseen, this process giving one ton of sulphuric acid for one ton of cement. The production capacity of the plant is assumed to produce 100,000 tons of sulphuric acid and 100,000 t/y of cement in the first production year, 230,000 t/y of sulphuric acid and 230,000 tons of cement in the second year and producing at full capacity of 320,000 t/y of sulphuric acid and 320,000 tons per year of cement. Investment costs of the project would be DT 26,980,000 of which DT 19,600,000 would be needed in foreign currencies. These investment costs include DT 600,000 for working capital of which DT 391,000 would be in foreign currencies.

2. Recommendations

- As long as the cement price in Tunisia is not set free, the project cannot be feasible without substantial subventions. These subventions can be conceived under the form of an equalizing tax on imported cement, which price is much higher than the price fixed by the Tunisian authorities. For a newly established factory, this tax would loose its justification as locally produced cement will replace ton by ton the imported cement. A production tax exemption for several years could also be envisaged.
- The factory is only profitable due to cement production.
- Financing should not be done solely by long terms loans but at least one third should be financed through subscription.
- The Tunisian authorities should conclude long term agreements with coke producing countries like Yugoslavia and could then get the imported coal at a better price than the one used in the study.

3. Financial returns

Assuming a selling price of 14 DT/t for sulphuric acid and 7.208 DT/t for cement the annual sales revenues would be DT 6,999,000, annual production costs would be DT 5,237,000 and annual benefits excluding amortization and taxes would be DT 1,762,000. Annual amortization being assumed at DT 2,460,000 there would be an annual loss of DT 698,000.

If a tax exemption could be obtained on cement of 6 DT/t, its selling price being then 13.208 DT/t, the annual sales revenues would be DT 8,979,000, annual production costs would be DT 5,237,000, annual profit before amortization and tax would be DT 3,742,000 and annual profit before tax would be DT 1,282,000. The internal rate of return (DCF rate) would then be 5.15%.

4. Economical benefits

- The import substitution of sulphur needed to produce 330,000 t/y of sulphuric acid, taking into account the additional coke needed for the process would bring an annual saving of foreign currencies of DT 760,000. The import substitution of 330,000 t/y locally produced cement would save DT 5,000,000 of foreign currencies per year.
- The project would create 150 new employment possibilities generating thus an additional income of DT 330,000.

5. Follow up action

- Letter Schroll, Project Manager from Project DP/TUN/72/005/Maneck dated 8-9-1975 : Copy of study sent to UNIDO.
- Letter Schroll/Maneck dated 8-10-1975 : CNEI would like to send a Tunisian chemical engineer for a short instruction course to the Chemie-Linz AG, Austria to study the Müller-Kühne process adapted to Phosphogypsum.
- Letter May/Stich, Chemie-Linz AG dated 15-12-1975 : Mr. Zamaidé from Tunisia will come to visit Chemie-Linz AG on a fellowship basis from 12-16/1, 1976.
- Return of Mr. Klinghoffer to Tunisia in October 1976 to update and expand the work completed in 1975 on the above project. He will complete the techno-economic study on the production of cement from by-product phosphogypsum and take into account the value of recoverable sulphur dioxide for the production of sulphuric acid in existing sulphuric acid plants at Gabès and Sfax. He will investigate alternative uses of by-product phosphogypsum for building blocks and panel boards and the production of plaster.
- Cable misc 766 Res.Rep/Veliky dated 29-7-1977: Expert still in the field in order to finish and discuss his report. The expert will leave on 6 August.

Inventory of feasibility studies

Country : Regional Africa (RAF) Countries of the Maghreb : Algeria,
Morocco, Tunisia.

Industrial Sector : Basic chemicals (32.1.C)

Serial Number : 42

Classification: 77/42/01/RAF/32.1.C/P/Calcium Carbide

Title of study: Project of calcium carbide production (DP/TUN/72/005)

Date of study : August 1975

Author of Study : National Centre of Industrial Studies (C.N.E.I.)

Sponsoring agency : UNIDO, National Centre of Industrial Studies (CNEI)

1. Description

The study includes a detailed market study of the three countries of the Maghreb, a technical study and an economical study.

The market study gives an import figure of 20,487 tons per year for 1971; the foreseen imports for 1980 are 24,300 tons/year and from 1985 to 1995 30,000 t/y. Tunisia has a part of 10%, Algeria 25% and Morocco 65% of these imports. The technical studies study the two offers received. The first offer is from the company UHDE, FRG, the second one is from Techno-export, Bulgaria. The UHDE offer is the most interesting because it is more recent and thus based on the most recent technological improvements. It is also more complete and the preference from the technical and chemical point of view goes to the "Kapsack" process, foreseen in this offer. This process operates with three monophased transformers and open hearths with "Soederberg" electrodes. The economical study states that economical conditions are equal in the three Maghreb countries, except costs of energy which cost factor can easily be exchanged in the financial analysis in the study. The study foresees a full capacity of 24,000 t/y which could be obtained in four years after the start up of production. In the first, second and third year, a production of 70%, 80% and 90% of full capacity could be reached. Investment costs would be 3,463,096 D.Tu. including a working capital of 440,000 D.Tu.

2. Recommendations

- Production of carbide diminishing in Europe, the present market study should be extended to clear whether this is due to new installations in the world or whether new techniques have been developed alternative techniques for products using formerly calcium carbide. Only under these reserves, the project is feasible.
- A detailed location study should be undertaken with regard to availability and price of raw materials like lime and coke, of electricity and with regard to transport costs. Therefore, the factory should be set up in the proximity of a lime factory or a lime quarry and of a harbour.
- Before realizing the project, it should be cleared that the maximum price for electrical energy does not exceed 0.008 D.Tu. per Kwh.

- At full production after the fourth year, it cannot be ascertained that all finished products can be absorbed by the Maghreb market. Therefore commercial efforts should be made to seek for possible exports to the African and Middle East Markets.
- A pollution study should be initiated.

3. Financial returns

At a price for electrical energy of 0.008 D.Tu/Kwh., the annual sales revenues at full capacity would be 3,600,000 D.Tu, the annual production costs would be 3,077,000 D.Tu. and annual gross profit would be 523,000 D.Tu. The internal rate of return (DCF rate) would be 16.1%.

The price for electrical energy rising to 0.011 D.Tu./Kwh., the annual sales revenues would stay the same, annual production costs would rise to 3,327,000 D.Tu. and annual gross profit would drop to 278,000 D.Tu. In this case, the internal rate of return (DCF rate) would be 9.2%.

4. Economical benefits

- The project would create 70 new labour employment possibilities and induce an additional income of 100,000 D.Tu. per year.
- Net savings in foreign currency due to import substitution would be 1,500,000 D.Tu. for the three countries of the Maghreb, having thus a positive effect on the balance of payments of the above countries.

5. Follow up action

- The study was done within the frame project DP/TUN/72/005 for the National Centre of Industrial Studies (CNEI) and one copy was sent to UNIDO. There is no follow up action according to the Registry file.
- Discussion with Mr. Maung dated 1-12-1977 : Mr. Maung does not know whether the project has been implemented or not.

Area : Regional Africa (RAF) Countries of the Maghreb : Algeria,
Morocco, Tunisia.

Industrial Sector : Metal Products (31.9.A)

Serial Number : 43

Classification: 77/43/01/RA/31.9.A/P/Burners, pressure reducers

Title of study: Study on electrical household appliances in the Maghreb
Volume III : Techno-economical study for the production
of burners and pressure reducers (DP/EN/56, C12)

Date of study : February 1975

Author of study : Borghi e Baldo ingg. S.p.a., Milan, Italy

Sponsoring agency : UNIDEX, Centre of Industrial Studies for the Maghreb

1. Description

In a first phase of the study (Vol.I), the Maghreb market of electrical household appliances and its demand has been analysed until 1982. It has been found out that the sector of gas cooking appliances (camping cookers, plate warmers, kitchen stoves) will develop at an important rate. It is estimated that the market demand of above appliances will be 730,000 units in 1978 and 1,220,000 units in 1982. The demand of these appliances is presently covered to a great extent by local production but a certain number of components such as gas taps and burners have still to be imported. Total demand for burners are estimated to be 2,520,000 units in 1978 and 3,000,000 units in 1982. In addition, production of pressure reducers for gas appliances were considered, the demand of which are estimated to be 1,000,000 units in 1978 and 2,000,000 units in 1982. For the calculation of investment costs, sales revenues, production costs etc. a counting unit "U.C." was assumed : 1 U.C. \approx 1 Tunisian Dinhar \approx 10 Algerian dinhars \approx 1 Moroccan Dirhams. Investment costs of the project would be 1,175,312 U.C. including working capital which would be 220,080 U.C. in the first year and 1,000,000 U.C. in the fifth year of production.

2. Recommendations

- To avoid the danger of setting up a competitive production in a too short delay and the danger of having difficulties with creating a competition if this eventuality is considered to be necessary, a holding company could be created with public capital of the three countries concerned. The financing of the new enterprise should be done by local capital at a sufficient percentage to satisfy the laws of the country where the new factory will be established. The balance should be financed with capital of above mentioned Maghreb holding company with the agreement that its participation will be guaranteed in all competitive enterprises to be created.
- Possible locations of the factory have been indicated taking into consideration the regional development plans of the three countries, the ~~best~~ industrial regions in the Maghreb which have been or which are going to be established (electricity, water, sewages, transport) and taking into consideration the actual location of assembling industries of electrical household appliances.

3. Financial returns

Annual sales revenues at full production would be 1,780,000 UC, annual production costs would be 1,545,533 UC in the 5th year and 1,374,755 UC in the 10th year of production and annual profits would be 234,467 UC in the 5th year of production and 405,245 UC in the 10th year. The annual rate of return on fixed capital would rise from 3.7% in the first year to 34.5% in the 10th year of production. The internal rate of return over 5 years of production would be 11%, over 10 years of production, this rate would be 22%.

4. Economical benefits

- The project would create 129 new employments at full production, inducing thus an additional income of 166,280 UC per year.
- The net cumulated savings on foreign currencies in the first five years of production would have a positive effect on the balance of payments of the Maghreb countries of 2,822,800 UC.

5. Follow up action

- Memo A. de Faria/Mant dated 14-3-1975 : Study favourably evaluated. Volume II dealing with technical repertoire will be of great use to potential users of the study.
- Memo Maneck/Becker-Boost dated 21-10-1975 : Copy of the report sent - the project should be considered for investment follow up action.
- No other relevant follow up action in Registry file.

Inventory of feasibility studies

Country : Regional Africa (RAF) Countries of the Maghreb : Algeria, Morocco, Tunisia.

Industrial Sector : Metal Products (31.9.A)

Serial Number : 44

Classification: 77/44/04/RAF/31.9.A/P/Gas Taps

Title of study: Study on electrical household appliances in the Maghreb
Volume IV : Techno-economical study for the production
of gas taps (DP/REM/66/072)

Date of study : 1974

Author of study : Borghi e Baldo ingg. S.p.a., Milan, Italy

Sponsoring agency : UNIDO

1. Description

In a first phase of the study (Vol.I) the Maghreb market of electrical household appliances and its demand has been analysed until 1982. It has been found out that the sector of gas cooking appliances (camping cookers, plate warmers, kitchen stoves) will develop at an important rate. It is estimated that the market demand of above appliances will be 780,000 units in 1978 and 1,220,000 units in 1982. The demand of these appliances presently covered to a great extent by local production but a certain number of components such as gas taps and burners have still to be imported. The gas taps represent a considerable part of the cost price of gas cooking appliances (15 - 20%). Total demand of gas taps has been estimated at 800,000 units in 1974. To cover further estimated demand, an initial production of 2,850,000 units in 1978 rising to 4,200,000 units in 1982 is foreseen in the study. For the calculation of investment costs, sales revenues, production costs etc. a counting unit "U.C." was assumed : 1 U.C. = 1 Tunisian dinhar, = 10 Algerian dinhars = 10 Morocco dirhams. Investment costs of the project would be 1,618,151 UC excluding working capital. The latter would be 220,775 UC in the first year of production and 315,259 UC in the fifth year.

2. Recommendations

- From the two models of taps taken into consideration (brass taps and aluminium taps), the study favours the brass taps.
- To avoid the danger of setting up a competitive production in a too short delay and the danger of having difficulties with creating a competition if this eventuality is considered to be necessary, a holding company could be created with public capital of the three countries concerned. The financing of the new enterprise should be done by local capital at a sufficient percentage to satisfy the laws of the country where the new factory will be established. The balance should be financed with capital of above mentioned Maghreb holding company with the agreement that its participation will be guaranteed in all competitive enterprises to be created.

- Possible locations of the factory have been indicated taking into consideration the regional development plans of the three countries, the industrial regions in the Maghreb which have been or which are going to be established (electricity, water, sewages, transport) and taking into consideration the actual location of assembling industries of electrical household appliances which will become the most important customers of the new industry. The following possible locations are suggested : in Algeria, Skikda or Setif; in Morocco, Fez or Oujda and in Tunisia, Menzel Bourguiba or Sousse.

3. Financial returns

Annual sales revenues at full production would be 2,100,000 UC, annual production costs would be 1,647,942 in the 5th year and 1,390,932 UC in the 10th year of production and annual profits would be 452,058 UC in the 5th year and 709,068 UC in the 10th year of production. The annual rate of return on fixed capital would rise from 9.5% in the first year to 43.4% in the 10th year of production. The internal rate of return over 5 years of production would be 15.5%, over 10 years of production, this rate would be 26.5%.

4. Economical benefits

- The project would create 136 new employments at full production, inducing thus an additional income of 172,648 UC per year.
- The net cumulative savings on foreign currencies in the first five years of production would have a positive effect on the balance of payments of the Maghreb countries of 949,530 UC.

5. Follow up action

- Memo A. de Faria/Mant dated 14-3-1975 : Study favourably evaluated. Volume II dealing with technical repertoire will be of great use to potential users of the study.
- Memo Maneck/Becker-Boost dated 21-10-1975 : Copy of the report sent - the project should be considered for investment follow up action.
- No other relevant follow up action in Registry file.

Inventory of Feasibility Studies

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Country : Regional Africa (RAF) Countries of the Maghreb : Algeria, Morocco, Tunisia.

Industrial Sector : Electrical machinery and electronic equipment (31.9.C)

Serial Number : 45

Classification: 77/45/01/RAF/31.9.C/P/Flat irons, hair dryers

Title of study: Study on electrical household appliances in the Maghreb
Volume V - Techno-economical study for the production of
flat irons, hair dryers (DP/REN/66/072)

Date of study : 1974

Author of study : Borghi e Baldo ingg. S.p.a., Milan, Italy

Sponsoring agency : UNIDO

1. Description

In a first phase of the study (Vol.I) the Maghreb market of electrical household appliances and its demand has been analysed until 1982. It has been found out that the sector of certain models of small electrical household appliances will develop at an important rate. The demand for flat irons in the Maghreb countries will rise from 140,000 units in 1978 to 255,000 units in 1982. Until now the demand is satisfied by imports only. It has been found out in the course of the study that similar quantities can be produced in the Maghreb region in a competitive way. Therefore production of 140,000 flat irons should be started in 1978 and gradually increased to attain a production of 255,000 units in 1982. In the study it was considered that an initial production of 35,000 hair dryers should also be considered which could then be raised to 62,000 units within 5 years. For the calculation of investment costs, sales revenues, production costs etc. a counting unit "U.C." was assumed : 1 U.C. = 1 Tunisian dinar = 10 Algerian dinars = 10 Morocco dirhams. Investment for initial production would be 684,405 U.C. and would rise to 772,605 U.C. in the fifth year excluding working capital for initial production of 66,300 U.C. and 110,781 in the 5th year.

2. Recommendations

- To avoid the danger of setting up a competitive production in a too short delay and the danger of having difficulties with creating a competition if this eventuality is considered to be necessary, a holding company could be created with public capital of the three countries concerned. The financing of the new enterprise should be done by local capital at a sufficient percentage to satisfy the laws of the country where the new factory will be established. The balance should be financed with capital of above mentioned Maghreb holding company with the agreement that its participation will be guaranteed in all competitive enterprises to be created.
- Possible locations of the factory have been indicated taking into consideration the regional development plans of the three countries, the industrial regions in the Maghreb which have been or which are going to be established (electricity, water, sewages, transport) and taking into consideration the actual location of assembling industries of electrical household appliances which will become the most important customers of the industry. The following possible locations are

suggested : in Algeria, Skikda or Setif; in Morocco, Fes or Oujda and in Tunisia, Menzel Bourguiba or Sousse.

3. Financial returns

Annual sales revenues at full production would be 920,000 U.C., annual production costs would be 652,419 U.C. in the 5th year and 533,050 in the 10th year of production and annual profits would be 267,581 U.C. in the 5th year of production and 366,950 U.C. in the 10th year. The annual rate of return on fixed capital would rise from 5.6% in the first year to 47.5% in the 10th year of production. The internal rate of return over 5 years of production would be 17%, over 10 years of production, this rate would be 28%.

4. Economical benefits

- The project would create 76 new employments at full production, inducing thus an additional income of 94,006 U.C. per year.
- The net cumulated savings on foreign currencies in the first five years of production would have a positive effect on the balance of payments of the Maghreb countries of 1,266,000 U.C.

5. Follow up action

- Memo A. de Faria/Mant dated 14-3-1975 : Study favourably evaluated. Volume II dealing with technical repertoire will be of great use to the potential users of the study.
- Memo Maneck/Becker-Boost dated 21-10-1975 : Copy of the report sent - the project should be considered for investment follow up action.
- No other relevant follow up action in Registry file.

Inventory of Feasibility Studies

003351

Country : Regional Africa (RAF) Countries of the Maghreb; Algeria, Morocco
Tunisia.

Industrial Sector : Electrical machinery and electronic equipment (31.9.C)

Serial Number : 46

Classification: 77/46/01/RAF/31.9.C/P/Compressor groups for refrigerators

Title of study: Study on electrical household appliances in the Maghreb
Volume VI : Techno-economical study for the production of
compressor groups for refrigerators (DF/FEM/66/072)

Date of study : 1974

Author of study : Borghi e Baldo ingg. S.p.a. , Milan, Italy

Sponsoring agency : UNIDO

1. Description

In a first phase of the study (Vol.I) the Maghreb market of electrical household appliances and its demand has been analysed until 1982. It has been found out that the sector of refrigerators for household use will develop at an important rate. It is estimated that the market demands for above refrigerators will be 260,000 units in 1978 and 420,000 units in 1982. The demand will be covered to a great extent by local production but a certain number of components such as evaporators, thermostats, magnetic joints have still to be imported. As far as compressor groups are concerned which represent a considerable part of the cost price of the refrigerator (about 20%), the demand would justify an initial production of 260,000 units in 1978 rising to 420,000 units produced in 1982. For the calculation of investment costs, sales revenues, production costs etc. a counting unit "U.C." was assumed : 1 U.C. = 1 Tunisian dinhar = 10 Algerian dinhars = 10 Morocco dirhams. Investment costs of the project would be 3,670,420 U.C. excluding working capital. The latter would be 447,250 U.C. in the first year of production and would then increase to 687,700 U.C. in the fifth year.

2. Recommendations

- There are about six companies having the know-how for this type of compressor. If the decision to produce the compressor group is taken, one or several of these companies should be contacted to negotiate the conditions of the transfer of this know-how.
- To avoid the danger of setting up a competitive production in a too short delay and the danger of having difficulties with creating a competition if this eventuality is considered to be necessary, a holding company could be created with public capital of the three countries concerned. The financing of the new enterprise should be done by local capital at a sufficient percentage to satisfy the laws of the country, where the new factory will be established. The balance should be financed with capital of above mentioned Maghreb holding company with the agreement, that its participation will be guaranteed in all competitive enterprises to be created.
- Possible locations of the factory have been indicated taking into consideration the regional development plans of the three countries, the industrial regions in the Maghreb which have been or which are going to be established (electricity, water, sewage, transportation) and taking into consideration the actual location of assembling

industries of electrical household appliances which will become the most important customers of the new industry. The following possible locations are suggested : In Algeria : Skikda or Setif; in Morocco, Fez or Dajda and in Tunisia, Menzel Bourguiba or Sousse.

3. Financial returns

Annual sales revenues at full production would be 5,040,000 U.C., annual production costs would be 3,834,050 UC in the 5th year and 3,276,450 UC in the 10th year of production and annual profits would be 1,205,950 UC in the 5th year and 1,763,550 UC in the 10th year of production. The annual rate of return on fixed capital would rise from 4.8% in the first year to 48.1% in the 10th year of production. The internal rate of return over five years of production would be 14%, over 10 years of production this rate would be 26%.

4. Economical benefits

- The project would create 195 new employments, inducing thus an additional income of 270,000 UC per year.
- The net cumulated savings on foreign currencies in the first five years of production would have a positive effect on the balance of payments of the Maghreb countries of 4,050,000 U.C.

5. Follow up action

- Memo A. de Faria/Mant dated 14-3-1975 : Study favourably evaluated. Volume II dealing with technical repertoire will be of great use to potential users of the study.
- Memo Maneck/Becker-Boost dated 21-10-1975 : copy of the report sent - the project should be considered for investment follow up action.
- No other relevant follow up action in Registry file.

Inventory of Feasibility Studies

003352

Country : Regional Africa (RAF) Countries of the Maghreb, Algeria, Morocco, Tunisia.

Industrial Sector : Electrical machinery and electronic equipment (31.9.C)

Serial Number : 47

Classification: 77/47/01/RAF/31.9.C/P/Electric motors

Title of study: Study on electrical household appliances in the Maghreb, Volume VII : Techno-economical study for the production of electric motors (DP/REN/66/072)

Date of study : 1974

Author of study : Borghi e Baldo ingg. s.p.a. Milan, Italy

Sponsoring Agency : UNIDO

1. Description

In a first phase of the study (vol. I) the Maghreb market of electrical household appliances and its demand has been analysed until 1982. It has been found out that the sector of certain models of small electrical household appliances will develop at an important rate. These household appliances will use electric motors with a power ranging from 1/8 to 1/2 H.P. These engines can be used for air conditioners, small ventilators, compressor groups for refrigerators, hair dryers and washing machines. It is estimated that the market demand for these electric motors could rise from 550,000 units in 1978 to 650,000 units in 1982. Similar quantities could be produced in the Maghreb in a competitive way. Therefore 550,000 electric motors should be produced in 1978 and production should be gradually increased to 650,000 units in 1982. Production equipment foreseen for the first year of production permits to reach the 1982 production level without any modifications. Investment costs of the project would be 2,025,950 U.C. (1 U.C. = 1 counting unit = 1 Tunisian dinhar = 10 Algerian dinhars = 10 Morocco dinhars). 248,950 U.C. of working capital would be needed in addition.

2. Recommendations

- To avoid the danger of setting up a competitive production in a too short delay and the danger of having difficulties with creating a competition if this eventuality is considered to be necessary, a holding company could be created with public capital of the three countries concerned. The financing of the new enterprise should be done by local capital at a sufficient percentage to satisfy the laws of the country, where the new factory will be established. The balance should be financed with capital of above mentioned Maghreb holding company with the agreement that its participation will be guaranteed in all competitive enterprises to be created.
- Possible locations of the factory have been indicated taking into consideration the regional development plans of the three countries, the industrial regions in the Maghreb which have been or which are going to be established (electricity, water, sewages, transport) and taking into consideration the actual location of assembling industries of electrical household appliances which will become the most important customers of the new industry. The following possible locations are suggested : in Algeria, Skikda or Setif, in Morocco, Foz or Oujda and in Tunisia, Monzel Bourguiba or Sousse.

3. Financial Returns

Annual sales revenues at full production would be 1950000 U.C., annual production costs would be 1,515,105 U.C. in the 5th year and 1,222,825 U.C. in the 10th year of production and annual profits would be 434,895 U.C. in the 5th year and 727,175 U.C. in the 10th year of production. The annual rate of return on fixed capital would rise from 8.4% in the first year to 35.8% in the 10th year of production. The internal rate of return over 5 years of production would be 14%, over 10 year of production this rate would be 24.5%.

4. Economical benefits

- The project would create 138 new employments, inducing thus an additional income of 192,000 U.C. per year.
- The net cumulated savings on foreign currencies in the first five years of production would have a positive effect on the balance of payments of the Maghreb countries of 4,345,000 U.C.

5. Follow up action

- Memo A.de Faria/Mant dated 14-3-1975 : Study favourably evaluated. Volume II dealing with technical repertoire will be of great use to potential users of the study.
- Memo Maneck/Becker-Boost dated 21-10-1975 : copy of the report sent. The project should be considered for investment follow up action.
- No other relevant follow up action in Registry file.

Inventory of Feasibility Studies

003353

Country : Sudan (SUD)

Industrial Sector : Wood Processing and Wood Products Industry (31.7.A)

Serial Number : 43

Classification: 77/48/01/SUD/31.7.A/F/Plywood

Title of study: Techno-economic feasibility study for the establishment of a plywood mill in the Sudan (VC/SUD/74/129)

Date of study : January 1976

Author of study : Forest Research Institute in Zvolem and Poly Techna, Foreign Trade Corporation, Prague, CSSR

Sponsoring Agency : UNIDO, Government

1. Description

The study analyzes techno-economic conditions for establishing a plywood plant in the South of the country. The market analysis confirms the actual need of plywood on the home market and examines also the possibilities of exporting. Local consumption was evaluated to be 2500 m³ of plywood in 1975, 6500 m³ in 1985 and 10,400 m³ in 1990. The possible exports for above years was expected to be 1000 m³, 3500 m³ and 4600 m³ respectively. Therefore a plywood plant producing 5000 m³ in 1976-1980 was found to be feasible. A second plant of equal capacity could be added for 1981-1985 and a third one for 1986-1990. Raw materials availability have been checked and five sites for the establishment of the plywood mill were evaluated : Katire, Nzara, Wav, Juba and Khartoum. Furthermore export possibilities of plywood to neighbouring countries through the ports of Port Sudan and Mombasa were examined. The region of Wav is the most suitable site for the first plywood plant from the point of view of suitable raw materials and transportation. In addition a warehouse is to be established in Khartoum.

The investment costs of a plywood factory producing 5000 m³ per year would be £S. 1,111,200 of which £S. 538,310 would be needed in foreign currency. Above excludes working capital of £S. 134,600 of which £S. 23,400 in foreign currencies. The break even point of the factory would be at 44.2% of full capacity.

2. Recommendations

- The respective authorities of the Sudan should : consider, evaluate and confirm the viability of the proposed investment, make available the financial resources needed and entrust an organization with further work aiming at establishing the plywood plant.
- For selecting and purchasing machinery and equipment the procedure should be followed as specified in the UNIDO paper issued under ID/WG.151/6 on 19 March 1973 "General selection guide lines for wood working machinery".
- In the frame of the contract with the selected deliverer of machinery, provisions should be included for sending two designated technicians to a running plywood mill of a similar capacity for a period of 3-6 months in order to get acquainted with the production flow as a whole, especially with running and maintaining the peeler, the dryer and the press.

- The development of infrastructure in the Wav region should receive high priority.
- A forest inventory and logging plan for the influx area of the plant should be prepared without delay.
- In order to increase consumption of plywood at reasonable cost, direct retailing should be organized by setting up marketing channels both in Wav and in Khartoum.
- In view to the promising prospects for sliced veneers, consideration should be given to possibilities ~~for~~ of extending the production facilities and programme in this respect. (Proposed output : 2000,000 m² per year, additional investment costs £S. 237,500 including £S.32500 for working capital, sales revenues £S.266,000; net profit £S.33,260).

3. Financial returns:

Annual sales revenues at full production will be £S. 850,100. Annual production costs will fall from £S.600,791 in the 6th year to 561,202 in the 15th year of production. Net annual profits will rise from £S. 99,724 in the 6th year to £S. 115,559 in the 15th year of production. The ratio - profit before tax plus depreciation divided by investment costs will be 25.4% for the average year; this ratio will be 28.9% for the 8th year. The ratio - profit after tax and before depreciation divided by investment costs will be 16.6% for the average year; this ratio will be 16.1% for the 8th year.

The internal rate of return of the project is 23.2%. The sensitivity analysis shows that seeling prices exercise the greatest influence on the return on investment : increase of sales revenues by 9.7% would be sufficient enough to compensate aggregate increases both of investment and operating costs by 10%.

4. Economical benefits

- The project would create 165 new employment possibilities inducing thus an additional income of £S. 66,760 per year.
- The annual value added would be about £S. 500,000.
- The imports of plywood could be stopped immediately and replaced by much less important imports of adhesives, spares and technical materials; the yearly net savings of foreign currency, both from substitution of import and potential exports would reach up to the amount of approximately US\$ 750,000 annually. Cumulative savings on foreign currencies over 15 years would be US\$ 11,262,823.
- In the social cost-benefit analysis the calculated social rate of discount of 8.4% shows the very high level of national economic profitability.

5. Follow up action

- Memo A.V. Bassili/Veliky dated 17-3-1976 : Study is positive but following assistance, which could be financed by OPEC and given by UNIDO should be considered : expanded market survey, forest inventory, preparation of call for tenders, technical evaluation of tenders to supply the equipment and assistance in running and starting the plant. This total UNIDO assistance to be financed by OPEC would amount to \$ 598,500.

- Letter Veliky/Res.Rep. dated 11-3-1977 : Edited version of the report sent. UNIDO would be grateful if informed of any comments of the Sudanese authorities concerning the report and whether any of the recommendations made by the consultants have been implemented.
- Note for the file from Mr. Bassili dated 25-3-1977 : Meeting with Mr. Idris Ali Ahmed, official of the Ministry of Industry of the Sudan : Mr. Bassili mentioned that the Sudan might wish UNIDO's assistance in the evaluation of bids for the proposed plant as the study contains detailed enough technical specifications for the equipment to enable the Ministry of Industry to prepare the call for tenders. The assistance would only be needed for the technical evaluation of the offers, the suppliers of equipment will make. UNIDO would sub-contract such a task to a specialized firm of consulting engineers.
- Discussion with Mr. Bassili dated 16-12-1977 : No other follow up action since. Before setting up the plant, a thorough forest inventory would be needed.

Inventory of Feasibility Studies

003354

Country : United Republic of Tanzania (URT)

Industrial Sector : Heavy clay, ceramics, glass and allied products industry
(32.1.B)

Serial Number : 49

Classification: 77/49/O1/URT/32.1.B/F/Sheet Glass

Title of study: Glass project - Tanzania - Manufacture of sheet glass -
Feasibility Study (DP/URT/74/018)

Date of study : 1975

Author of study : The National Industrial Development Corporation Ltd.
(NIDC), New Delhi, India

Sponsoring Agency : UNIDO, Government (National Development Corporation)

1. Description

The various categories of glasses covered under the scope of the present study include the following : (1) container glass including article like glass bottles (2) table ware including mainly glass tumblers used in households, restaurants, hotels, etc. (3) sheet glass of a thickness of 2 mm to 6 mm used for micro slides, clock covers, photo framing, windows, doors, partitions, furnitures and commercial buildings. The study retains only the production of sheet glass the demand of which is expected to be around 3500 tons in Tanzania by 1978-79. As there is no plant for the manufacture of sheet glass in the whole of East African Community, Zambia, Malawi, Burundi etc., ample export possibilities are foreseen. A plant with a production capacity of 6500 t/y of sheet glass based on P.P.G. process is suggested; it is expected that about 3000t/y of the total sheet glass produced will be exported. Economics have been carried out based on the assumption that the plant will be located in Dar-es-Salaam. Most of the raw materials like silica sand, quartz, lime stone, dolomite and feld-spar are locally available. Soda ash is to be imported from Kenya and salt cake from India.

The total investment costs excluding working capital would be Shs.38,500,000 from which 24,110,000 Shs. would be needed in foreign currencies. Working capital corresponding to full rated production are estimated to be 3,100,000 Shs. It is assumed that the plant would be able to achieve 100% utilization of its rated capacity during the third year of operation. During years of cold repair (years 4, 7, 10) the production is expected to be 75% of the rated capacity of the plant. The break even point occurs at nearly 57% of full rated production, taking the sixth year of plant operations as a basis of computations.

2. Recommendations

- The study considers that a new facility for the production of containers and table ware is not advisable. It is recommended that the Government of Tanzania should analyse the demand and supply position for glass bottles and tumblers in the year 1977-78 and if need be, additional facility could be planned at that stage.

Keeping in view the sources of supply of the various raw materials and demand centres of the finished products, the plant could be located

near Dar-es-Salaam, in the Tanga region or in Bukoba. From above alternatives Dar-es-Salaam is considered to be the best site. However, a detailed location study is suggested before plant location is finalized.

- It would be necessary to evolve training programmes for key personnel who may have to be sent abroad.
- In the initial period, it is suggested to induct 20 expatriates to man the key managerial positions as also at maintenance and operational levels.
- Technical know-how and production technology is proposed to be imported:

3. Financial returns

Annual sales revenues will be Shs. 19,500,000 during ~~the~~ full production and Shs. 15,040,000 during the years of cold repair. Annual production costs will fall from Shs. 15,843,000 in third year to Shs. 10,095,000 in 10th year of production. Net profit will vary between Shs. 1,126,000 and Shs. 5,054,000. The average annual gross return on fixed investment will be 13.4% and the internal rate of return on total investment by discounted cash flow analysis will be 10.4%. The sensitivity analysis shows that a 10% change in sales realization would cause a corresponding variation of around 4.54% on average annual gross return on fixed investment. Likewise, a 10% change in prices of raw materials would vary the average annual gross return on fixed investment by 0.4%.

4. Economical benefits

- The proposed project will result in foreign exchange savings of about Shs. 10,000,000 after taking into account all elements of foreign exchange spent annually on imported raw materials and depreciation of imported equipment. In addition there will be foreign exchange earned of about Shs. 6,900,000 per year in the year of stabilized production due to the export of sheet glass.
- The plant shall generate employment level of 234 personnel and this induce additional income of Shs. 2,300,000 per year. The average wage rate would be approximately Shs. 830 per month against prevalent rate of agricultural labour of Shs. 350 per month, which is representative of wage rate of Tanzanian labour. The differential will generate additional savings and direct and ~~indirect~~ indirect taxes.
- Taking a mobility rate of 10% for labour, about 23 persons shall be trained mostly for high skill jobs. These people in turn are likely to act as trainers resulting in multiplication of skills.
- The plant shall give technological base to the country.
- Above all, the plant shall ensure supplies to the various consumers which will give a boost to the economy.

5. Follow up action

- Letter S.I. Husain, NDC/Rothblum dated 10-2-1976 : Feasibility Study on sheet glass prepared for the NDC sent to UNIDO.
- Memo Verghese/Hernried dated 15-3-1976 : Study represents a thorough and qualified piece of work. In case of NDC deciding to proceed with the project, it would be able to profit considerably from the services of an experienced sheet glass expert.

- Letter S.I. Husain, NDC/Res.Rep. UNDP dated 2-6-1976 : NDC is carrying out negotiations with Belgium for getting funds and proposals for machinery, technical know-how and management services. The services of sheet glass expert will be required by NDC after about 6 months.
- Letter S.I.Husain, NDC/Herrried dated 17-8-1976 : Belgium Government made a grant loan of about 20 million Tanzanian shillings for the glass project. When Belgium firms were asked for bids, the quotations came to about 80 million Tanzanian shillings. Therefore the Government of Tanzania has to look for other resources from Belgium or from other countries and a delay in the project implementation is expected. A UN expert would be useful in the early 1977. This expert should visit the country periodically and bring the project up-to-date while funding is being arranged.
- Project SI/URT/77/802, 4 m/m for an expert in sheet glass approved in January 1977.
- October 1977 : UNIDO expert in sheet glass, Mr. Mathelot, sent to Tanzania.
- Letter Mathelot/Biering dated 16-11-1977 : First phase of mission accomplished. Tender document (based on Fourcault production process) has been sent to about 15 companies and propositions of these companies will be evaluated in second part of the mission.
- Letter Biering/Res.Rep. dated 6-12-1977 : Mr. Mathelot's next mission should be timed when bids have been received (dead line 15-2-1978). The second mission should therefore start around 1 March 1978. A follow up project should include training abroad of the key personnel of the plant as well as some expert assistance in the form of a series of short missions during the erection and initial production phases for a total duration of 24 m/m (\$ 147,000). For this follow up assistance a reasonable amount of the IPF could be earmarked for this purpose.

Inventory of Feasibility Studies

003355

Country : United Republic of Tanzania (URT)

Industrial Sector: Pulp and Paper (32.1.E)

Serial Number : 50

Classification: 77/50/01/URT/32.1.E/F/

Title of study: New Investment recommendation - Proposal to establish
an integrated pulp and paper mill in Mufindi
(DR/URT/74/018)

Date of study : May 1977

Author of study : National Development Corporation (NDC), Tanzania

Sponsoring agency: UNIDO, National Development Corporation (NDC)

1. Description

Tanzania is spending considerable amounts of foreign exchange on import of paper, despite the fact that raw materials suitable for producing fine quality paper is available within the country. Therefore the establishment of an integrated Pulp and Paper Mill has great priority in the country's industrial development strategy and the Economic Committee of the Cabinet has already approved this project. The demand estimation for Tanzania worked out by consultants and accepted by the World Bank indicate that local market will absorb 31,300 tons in 1976, 60,000 tons in 1985 and 85,000 tons ~~in~~ in 1990. The project envisages the installation of an integrated pulp and paper mill with a capacity of 60,000 tons per year with a product-mix of 8,200 t/y of newsprint, 12,000 t/y of printing and writing paper, 11,700 t/y of kraft liner board and 28,100 t/y of Kraft paper. For the grades to be produced by the mill, demand will be 30,800 t/y in 1980, 44,500 t/y in 1985 and 64,700 t/y in 1990. The surplus production between 1985, when the factory is producing at full capacity and 1990 could be easily exported to Zambia, Mozambique, Burundi and Rwanda. The mill is designed for later expansion to a total capacity of 75,000 t/y, 8 to 10 years after start up. The investment/costs of the project including working capital will be Tshs. 1583.7 million of which Tshs. 1201.5 million will be needed in foreign currency. Working capital requirements will amount to Tshs. 32.9 million of which Tshs. 14 million in foreign currency. The break even analyses for the year 1981 shows that the break even is reached at a capacity utilization of 81%.

2. Recommendations

- The mill will be located down the Mufindi escarpment. This site has the advantage of excellent transportation links with the rest of the country, availability of sufficient water, good basis for effluent disposal and availability of pulpwod at a very close distance.
- A number of expatriates in key positions will be needed, because there is no domestic experience available in pulp and paper mill operation. The number of expatriates will be reduced as soon as the local staff is well trained.
- To be able to start up the pulp and paper mill in 1981, the following steps are to be taken during the implementation period:

- (a) The railway to the mill site should be completed in good time to facilitate transport of materials and equipment;
- (b) A coal mine should be in operation in good time before trial runs of the mill;
- (c) The township should be ready for the employees;
- (d) The chlorine and caustic soda plants should be ready before the start of the bleach plant;
- (e) The escarpment road should be ready for wood transport.

3. Financial return

Annual sales revenues will increase from Tshs. 134.6 million in 1981 to Tshs. 279.0 million in 1985 and to Tshs. 299.4 million in 1990. Annual production costs will amount to Tshs. 221.0 million in 1981, to Tshs. 242.8 million in 1985 and to 209.3 million in 1990. Annual profit (net income) will rise from Tshs. minus 86.4 million 1981 to Tshs. 36.2 million in 1985 and to Tshs. 90.1 million in 1990. The financial rate of return would be 9.7% based on World Bank spending pattern and 10.8% based on the spending pattern established in the study. The sensitivity analysis based on the above rate of return of 9.7% shows that a 10% decrease of revenues would result in a return of 7.8% while a 10% increase in revenues would raise the return to 11.6%. Increase in manufacturing costs affect the return to a much lesser extent. A six month delay in project implementation, combined with a 10% capital cost overrun, would reduce the return to 8%. If f.o.b. export price of the project's exportable output has to carry a 30% instead of 15% discount so that it can be effectively exported, the financial rate of return would decrease to 9.4%.

4. Economical benefits

- The project will create 799 new jobs including 73 expatriates in the beginning of operations, thus creating considerable additional income (4.4 millions Tshs. for 635 men employed in the production process).
- Based on the economic projections of costs and benefits, the economic rate of return equals 12%. The economic return is sensitive to changes in revenues; it would decrease to 9.8% if world paper prices dropped by 10%. A more likely outcome is a real 10% increase in world paper prices which would raise the economic rate of return to 14%. The project return is less sensitive to investment and manufacturing costs: it would drop to 9.2% if the project cost increased by 10% and at the same time suffered a 6 month delay in implementation.
- In above calculation of the economic return of the project, external and secondary effects of the projects have not been taken into account. But it is evident that there will be external benefits and development impulses initiated by the project which will be of considerable importance for the economy.
- The foreign exchange surplus increases from Tshs. 10.3 million in 1981 to Tshs 16 million in 1984 and to Tshs 19.3 million in 1987 and onwards. From the implementation start to the fifth year of operation, when 100% capacity utilization is achieved, the accumulated foreign exchange surplus amounts to Tshs. 85.1 million and including the 10th year of operation to Tshs 184.6 million. These figures express the relief the project will provide to the strained foreign exchange position in Tanzania.

5. Follow up action

- A detailed feasibility study has been carried out by Jaakko Pöyri and Company, Helsinki in 1976 for NDC titled "Pulp and Paper Mill Feasibility Study" and established the viability of the project. Based on this study, the World Bank pre-appraised the project in 1976.

- Semi-annual project progress report - URT/74/018 (1-2-77 to 31-7-77) : National priority has been assigned to the project and completion is expected in 1981. The project has also been approved by the NDC Board of Directors on 21-6-1977. The World Bank is sending a mission to finally appraise the project in September 1977. KFW (FRG) and SIDA (Sweden) will also join this appraisal as they are also keen about this project. US\$ 140 million out of US\$ 191 million total investment costs have already been committed jointly by IBRD, SIDA and KFW. The implementation schedule will be as follows : Design and preparation by Project Manager : October 1977; request for tender : December 1977; machinery ordering : February 1978; civil construction start : September 1978 and commercial production : January 1981.

Inventory of Feasibility Studies

003356

Country : United Republic of Tanzania (URT)

Industrial Sector : Food Industry (31.7.C)

Serial Number : 51

Classification: 78/51/01/URT/31.7.C/F/Beer

Title of study: Feasibility study "Mwanza - Brewery"
Mwanza/Tanzania (DP/URT/74/018)

Date of study : April 1975

Author of study : Henninger International, Frankfurt/Main, FRG

Sponsoring Agency : UNIDO, National Development Corporation (NDC)

1. Description

At present beer is being produced in Tanzania by Tanzania Breweries Ltd. with the total capacity being approx. 750,000 hls per year. A total market volume of 1.3 million hls per year is expected by 1977. Therefore the Government of Tanzania is intending to realize at Mwanza a brewery project called "Mwanza Brewery" to produce beer for the local market.

In conformity with market potential, the brewery is designed for an initial capacity of 350,000 hls beer and 150,000 hls soft drinks per year with total investment costs of Tshs. 175 million including Tshs. 18,265,000 for working capital. A first extension phase with up to 700,000 hls beer per year has been taken into account when planning the layout of the brewery, so that the relevant additional investment costs would be as low as possible. Break even point is at a production of 190,000 hls beer and 50,000 hls soft drinks per year, which is only approx. 50% of the capacity.

2. Recommendations

- The project is highly profitable due to the recent increase in sales prices.
- Mwanza Brewery should concentrate on direct distribution, in order to make its products always available and achieve high market shares in specific market areas.
- Henninger International will provide the necessary know-how by concluding a Technical Management and Licence Contract serving as a guarantee for the Government of Tanzania, the banks and all investors, that the company will be run successfully and that a premium beer of high quality will be produced.
- The brewery can be managed with seven highly qualified expatriates. The delegation of this personnel will be part of the Technical Management and Licence Contract and the relevant costs involved will be borne by Henninger International.

3. Financial return

Sales revenues at full production i.e. from the third year of production onwards will be Tshs. 351,450,000, annual production costs from 8th year onwards will be Tshs. 319,108,000 and annual net profit after tax from the 8th year onwards will be Tshs. 17,788,000.

According to the calculations, the company will be able to distribute dividends from 5% in the third year of operation upto 25% in the seventh year.

4. Economical benefits

- The project would create about 500 new labour employment possibilities creating thus an additional income of about Tshs. 2.6 million.
- Production of beer to satisfy local demand would have an import substituting effect and would thus hav a positive impact on the country's balance of payments.

5. Follow up action

- The semi-annual progress report 1-2-1977 - 31-7-1977 of Project DP/URT/74/018 - Assistance to National Development Corporation, page 10, states that NDC has received technical offers from five agencies which are being evaluated and that arrangements for funding are also being negotiated with various institutions.
- No other relevant information in the Registry file.
- Discussion with Mr. Sepic dated 9-1-1978 : Mr. Sepic has no information on the subject project.

Inventory of Feasibility Studies

003357

Country : United Republic of Tanzania (URT)

Industrial Sector: Metal Products (31.9.A)

Serial Number : 52

Classification: 78/52/01/URT/31.9.A/F/Drums

Title of study: Feasibility study for drum making plant (DP/URT/74/018)

Date of study : January 1977

Author of study : Research and Development Department of National
Development Corporation, Tanzania (NDC)

Sponsoring agency: UNIDO, National Development Corporation (NDC)

1. Description

At present, bitumen, lubricating oil and the steel drums in which these are contained, are all imported mainly from Kenya and the estimated cost of the drums alone exceeds Tshs. 15.1 million in foreign exchange annually. Implementation of a Bitumen and Lubricating Oil project are foreseen at the Tipper Refinery at Kigamboni. These projects will create a large demand for drums and unless this demand is satisfied by implementing the Drum Making Plant simultaneously with these projects, it will have to be met by imports of empty drums, which is not an economically acceptable solution. Therefore a drum making plant producing 200,000 lubricating Oil Drums and 300,000 Bitumen Drums at full capacity (3rd year of production) is advisable to satisfy the demand for drums of the two above projects. Investment costs excluding working capital would be Tshs. 25.5 million of which Tshs. 18.25 million would be needed in foreign currency. Initial working capital would be Tshs. 8.7 million, out of which Tshs. 5.45 in foreign currency, from the third year of production onwards. Tshs. 13.7 million per year out of which Tshs. 8.6 million would be needed in foreign currency. ~~XXXX~~ The break even point would be at about 21% of capacity. The implementation period would be 24 months from the date of Board decision and the project's life time is assumed to be 10 years.

2. Recommendations

- The project is commercially viable and it should be implemented together with the lubricating oil and with the Bitumen projects.
- The plant should be located adjoining the Tipper Refinery as otherwise the transport of the empty drums would be a major problem. It is proposed to transport the drums by a conveyor belt into the refinery.

3. Financial return

Annual sales revenues at full capacity (3rd year) would be Tshs. 53.5 million, annual production costs would be about Tshs. 40.2 million from the 3rd year onwards. Net profit after tax would rise from Tshs. 5.7 million in the 3rd year to Tshs. 7.2 million in the 9th year of production. The discounted return on investment (DCFrate) would be 15.5%.

Raw material cost, particularly the cost of imported steel sheets accounting for about 76% of the operating cost, changes in steel prices were considered for a sensitivity analysis. An increase of steel prices by 10% would decrease profits by 33%, a 20% increase in steel prices would decrease profits by 58%. An increase of about 34% in steel prices would bring the profit to nil.

4. Economical benefits

- The project will create 80 new employment possibilities of which 16 will be administrative and clerical workers and 64 production workers. This would create additional income of about 1 million Tshs.
- Import substitution would have an annual net positive effect of Tshs. 9.45 million from year three to five of production and of Tshs. 9.49 from year six to ten on the balance of payments. Accumulated net savings of foreign exchange during the 10 years life time of the project would amount to Tshs. 68.6 million.

5. Follow up action

- Letter S.I. Husain, Director, Development Department, NDC/De Andrea dated 17-1-1977 : "Feasibility Study for Drum making Plant" enclosed. The study is an in-house study carried out by the Development Department, NDC.
- Letter S.Hable-Selassie/S. Husain dated 2-2-1977 : Calculations indicate commercial viability but this appears to be marginal.
 - (a) price of imported drums, especially for lubricating oil is substantially lower than the assumed sales price.
 - (b) Rate of discount used for calculating present value appears also to be low which affects profitability.
 - (c) Project is strongly depending on imports of steel sheets and has therefore a very low level of value added.
 - (d) The unit investment generates less than 80% of savings in foreign exchange. The question could be raised as to whether investment elsewhere would not generate a higher rate of foreign exchange saving.
- Letter S.I. Husain/S.Hable-Selassie dated 22-2-1977 : The Bitumen and lubricating oil projects are still in an infant stage and therefore project will not be implemented in the near future. Despite the marginal commercial viability and the low return on foreign exchange employed, the project is imperative as importing ready built empty drums, transportation in bulk would be expensive and a major problem.
- No other relevant information in the Registry File.

Inventory of Feasibility Studies

Country: SOMALIA (SOM)

003358

Industrial Sector : Food Industry (31.7.C)

Serial Number : 53

Classification: 78/53/01/SOM/31.7.C/P/Milk Products

Title of study: Pre-feasibility study on the establishment of Milk processing Plants in Somalia (DP/SOM/72/007)

Date of study : July 1976

Author of Study : S. Shafgat Ali

Sponsoring Agency : Government, UNIDO

1. Description

The study analyses the possibilities of setting up two milk production areas, one in the Snaag region and one in the Lower Juba region. Each of the milk production areas will comprise 25 collection centres including facilities for cattle feed for improving milk yield, artificial insemination and veterinary facilities. In each of the milk production areas, a milk processing plant will be established; both plants will together process 73,000 tons of milk per year at full capacity which will be arrived at in the fifth production year, and produce milk powder 2975 tons, evaporated milk 13,870 tons, condensed milk 2774 tons, cheese 694 tons and butter 1388 tons. Conceived as a Regional project, the two plants will export 90% of their products to countries of the region, namely Saudi Arabia, Oman, Egypt, Qatar, North and South Yemen, Libya, Iraq and Kuwait. The project will also produce butter oil for local sale to eliminate the import of edible oil. Of the two projects proposed, one is based on cow milk and the other on sheep and goat milk.

The total investment costs for the two areas will be So.Shilling 114 million. One of the plant with its milk production area will cost So.Sh. 57.06 million; the other So.Sh. 24.2 million will be needed in foreign currency. These investment costs include So.Sh. 14.08 million of working capital out of which So.Sh. 4.2 million in foreign currency. Break even point was found out to be at 42.21% of capacity utilization.

2. Recommendations

- It is considered more feasible to start by implementing one of the two projects. In this case the Lower Juba project should be given preference.
- A team of 3 short term experts, one each on livestock ranching for milk production, dairy technology and marketing of milk products should be sent to Somalia to work with the industrial economist of project DP/SOM/72/007 on a detailed feasibility study and to formulate specifications, tender documents, project implementation schedule, export marketing programme etc. The other alternative is to use a consulting firm for this purpose. UNIDO could meet the costs of proposed study.
- The countries of the region should be invited to participate in the financing of this project and should enter into long-term agreements for buying the products of this project.
- To establish the project, an incorporated body or a corporation may be promoted and set up.

- It will be necessary to seek and acquire technical collaboration of an international company engaged in the production and marketing of milk products. The other alternative is to seek technical assistance from USSR or Holland which have gained considerable experience in this industry.
- A certain built in flexibility of the plants should enable adjustments in the production programme possible to add new products like skim milk powder, cream powder, ice cream powder.

3. Financial return

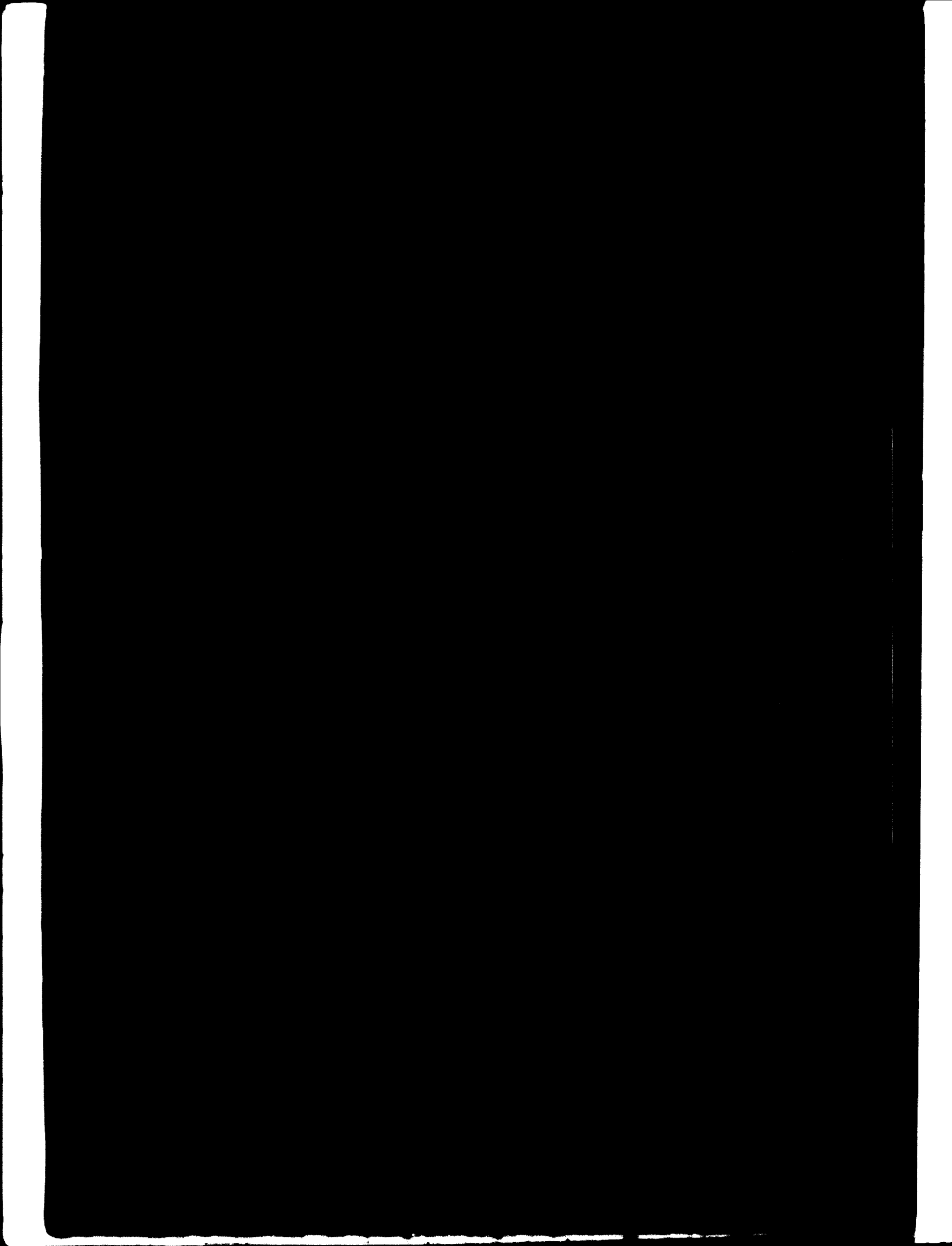
Annual sales revenues per plant at full production will be So.Sh. 98.404 million, annual operating costs will be So.Sh. 83.748 million and annual profit before tax will be So.Sh. 14.656 million. The return on investment in the fifth year will be 25.7%. Both plants working at full capacity, above figures will be double.

4. Economical benefits

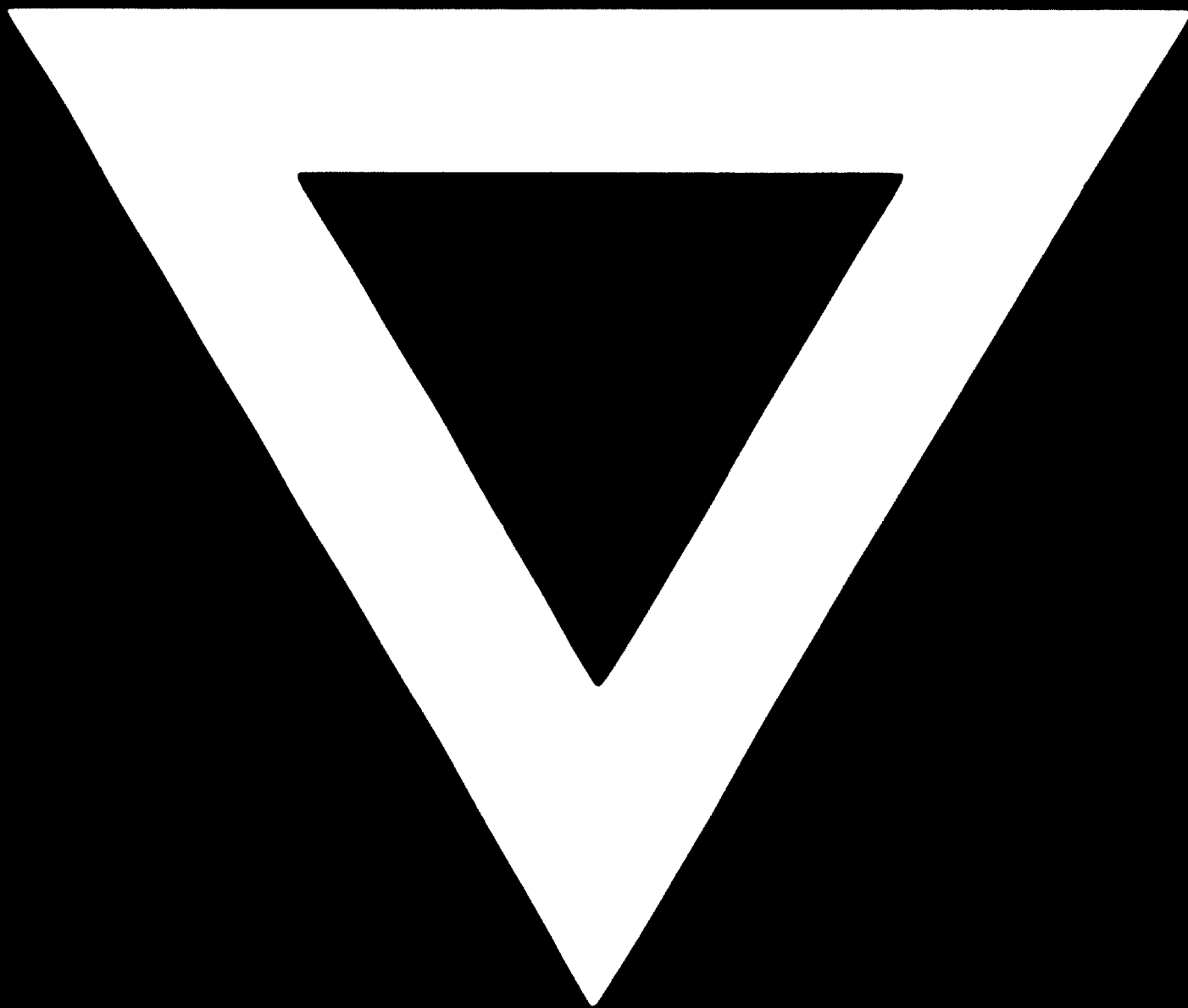
- By implementing the two plants, 672 new employment possibilities would be created, creating thus additional income of So.Sh. 5,511,600.
- The gross value added per plant would be So.Sh. 22.384 million which is 26.73% of total operating costs.
- The main purpose of the project is to earn foreign currency. However, the project as a whole would also replace annual imports and save foreign currency of So.Sh. 18.1 million. The earnings in foreign currency of the two plants would be So.Sh. 177.128 million from the fifth year onwards and thus the net balance of payment effect would be So.Sh. 134 million - a figure equivalent to 34% of the total foreign exchange earnings of Somalia. It would be possible to recover the entire investment in foreign currency during the first year of export.

5. Follow up action

The study has been made by the economist of the project DP/SOM/72/007 - "Strengthening the Ministry of Industry", and submitted to the Ministry of Industry of Somalia on 22-7-1976. Apparently there was no reaction from the Government. In the Progress Report of the project April 1977 to September 1977 under "Major Problems" part (iii) on page 1, the following is stated: "Although ten copies of every report are sent to Government, feedback from the Ministry or other agencies is virtually non-existent".



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