

ECA/JIDI/85137

DIRECTORY OF PROJECT PROFILES ON SMALL-SCALE INDUSTRIES IN AFRICA

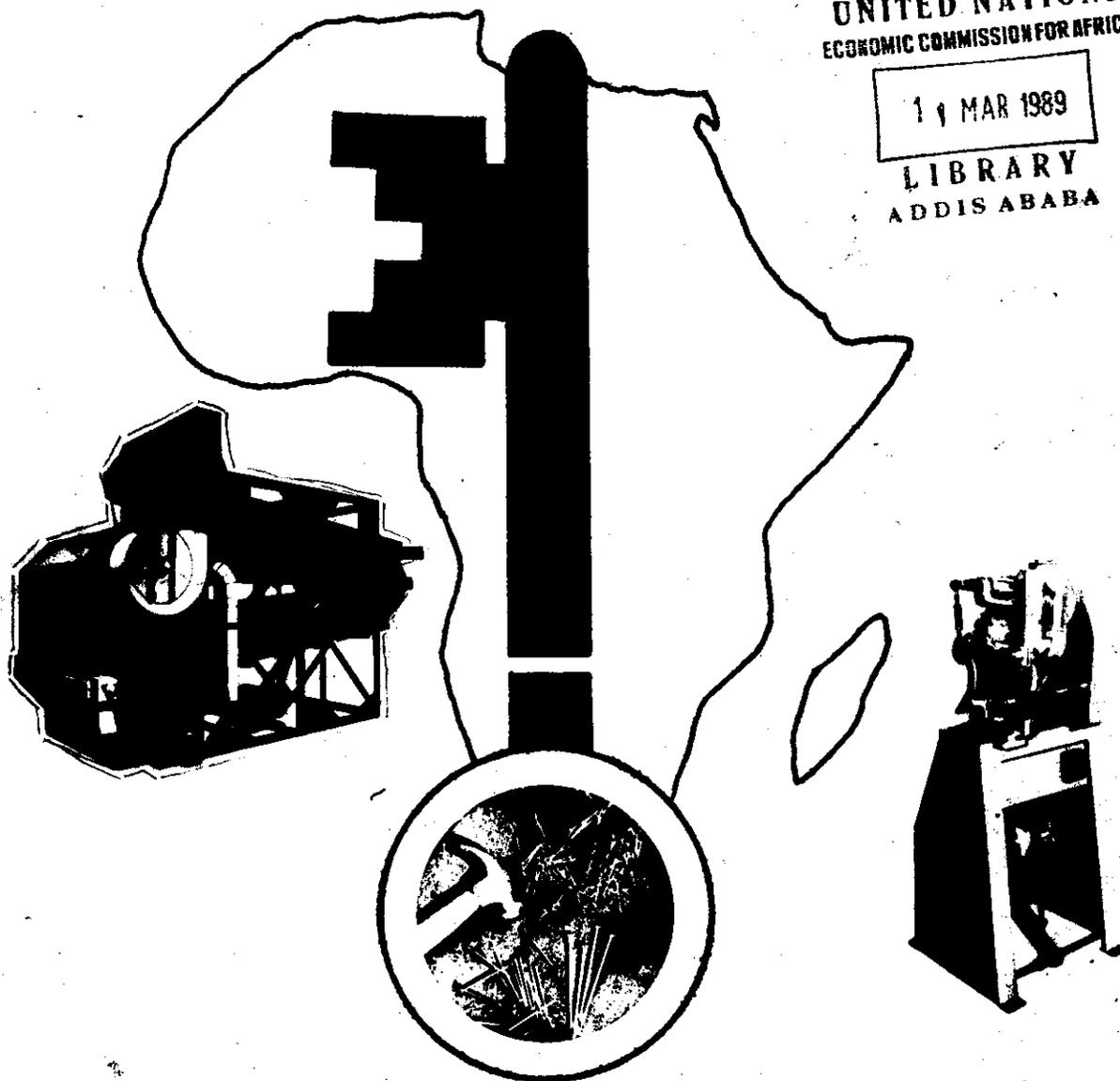
-SECOND EDITION-

HOW TO ESTABLISH SMALL-SCALE INDUSTRY YOURSELF

UNITED NATIONS
ECONOMIC COMMISSION FOR AFRICA

11 MAR 1989

LIBRARY
ADDIS ABABA



UNI
338.964(6)-
D5986 58.7

UNITED NATIONS
ECONOMIC COMMISSION FOR AFRICA
P.O. Box 3001, ADDIS ABABA, ETHIOPIA

45508

Distr.
LIMITED
ECA/JID/85/37
25 July 1986
Original: ENGLISH

UNITED NATIONS
ECONOMIC COMMISSION FOR AFRICA
Addis Ababa, Ethiopia 1986

UNITED NATIONS
ECONOMIC COMMISSION FOR AFRICA
17 MAR 1988
LIBRARY
ADDIS ABABA

DIRECTOR OF PROJECT PROFILES ON SMALL-SCALE INDUSTRIES
IN AFRICA
(Second Edition)

How to establish small-scale industry yourself

This Director is reproduced without formal editing.

The mention of manufacturers and suppliers names, machinery and product items does not imply the endorsement of the United Nations Economic Commission for Africa.

CONTENTS

	<u>Page</u>
PREFACE	i - ii
CHAPTER I BACKGROUND OF SMALL-SCALE MANUFACTURING ACTIVITIES	1 - 2
CHAPTER II ADVANTAGES OF ESTABLISHING THE MANUFACTURING SMALL-SCALE INDUSTRIES	3 - 4
CHAPTER III INDUSTRIAL ESTATES AS INSTITUTIONAL INFRASTRUCTURE FOR RATIONAL PROMOTION OF SMALL-SCALE INDUSTRIES	5 - 9
CHAPTER IV FINANCIAL ISSUES	10-21
CHAPTER V PROFILES OF SELECTED ITEMS	22-172
A. Food Products	22-48
A.1 Biscuit making unit	23-25
A.2 Bread making unit	26-29
A.3 Edible oil	30-33
A.4 Fish dryer unit	34-36
A.5 Fruit processing	37-38
A.6 Processed vegetables	39-42
A.7 Rice milling	43-45
A.8 Yeast and baking powder	46-48
B. Leather Products	49-65
B.1 Leather purses and handbags	50-52
B.2 Leather sandals	53-56
B.3 Leather suitcases and travel goods	56-59
B.4 Lining leather	59-62
B.5 Vegetable tanned hides and skins (semi-finished leather)	62-65
C. Textile Products	66-71
C.1 Knitted cotton cloth	67-69
C.2 Ready-made garments	69-71
D. Paper and Paper Products	72-85
D.1 Hand-made paper	72-76
D.2 Paper board cartons	77-79
D.3 Paper envelopes	80-82
D.4 Paper napkins and toilet paper rolls and facial tissues	83-85

C O N T E N T S (cont'd.)

	<u>Page</u>
E. Wood and Wood Products	86-107
E.1 Pencils	87-91
E.2 Wooden crates	92-94
E.3 Wooden door frames and shutters	95-97
E.4 Wooden furniture	98-101
E.5 Wood screws	101-104
E.6 Wooden storage shelves and racks	104-107
F. Metal Working and Engineering	108-137
F.1 Automobile radiator cores	111-114
F.2 Dairy equipment	114-118
F.3 Hair pins	118-120
F.4 Machine screws	121-123
F.5 Mechanical toys	123-126
F.6 Metal workshops	127-132
F.7 Umbrella assembly	133-134
F.8 Wire nails	135-137
G. Building Materials	138-152
G.1 Asphaltic roofing sheets	138-140
G.2 Ceramic tiles	141-144
G.3 Rice husk ash masonry cement	145-148
G.4 Lime	149-152
H. Rural Household Products	153-172
H.1 Washing soap	153-157
H.2 Safety matches	158-162
H.3 Wax candles	163-166
H.4 Kerosene stove	167-170
H.5 Stove wicks	171-172

ANNEX I QUESTIONNAIRE ON SMALL-SCALE INDUSTRY ESTABLISHMENTS

ANNEX II LIST OF PUBLISHED MATERIALS CONSULTED

P R E F A C E

1. The Sixth Conference of African Ministers of Industry ^{1/} held in Addis Ababa in November 1981 concluded, among other things, that:

- (a) Efforts should be made at the national level to develop small-scale industries, including handicraft and cottage industries;
- (b) More appropriate technologies should be utilized;
- (c) National or subregional special funds should be strengthened or new ones established, as appropriate, to accelerate the development of small-scale industries in Africa, taking into account the existence of African Industrial Development Fund (AIDF).

2. The advantage in setting up small-scale industries is that, apart from decentralization of production and supplies, they are labour-intensive and account for more jobs per unit of capital invested and their establishment encourages local enterprise and the development of integrated and inter-linked industrial development by sub-contracting, as well as complementary and supplementary production of basic materials and intermediate products.

3. The activities and projects to be carried out, particularly with regard to small-scale industries, as part of the implementation of the Industrial Development Decade for Africa, include the preparation of a Directory of Project Profiles for the whole of Africa, providing techno-economic information on, among other things, products to be manufactured, process descriptions, capacity and specifications of plant and machinery, raw materials and other inputs, financial requirements in the form of fixed and working capital, marketing and product distribution, and a programme of action to assist and advise small-scale industrial entrepreneurs in their manufacturing activities.

4. The United Nations Economic Commission for Africa is pleased to provide African small- and medium-scale industrial entrepreneurs with its second edition of the Directory of Project Profiles on small-scale industries in Africa. This Directory may also be used by all Africans engaged in various fields of national and international activities, and at various levels of responsibility for the implementation of the Industrial Development Decade for Africa. The present

^{1/} E/ECA/CM.8/2, Sixth Conference of African Ministers of Industry, second part, paragraphs 5-24, Addis Ababa, November 1981.

document is a revised version of the first edition, taking into account the suggestions received from various sources and also incorporates additional profiles which cover two new areas (building materials and rural household products) and information on additional sources of machinery suppliers.

5. In due course, the Economic Commission for Africa expects to introduce further refinements to the Directory so as to provide additional technical and other project development information and also to include other product lines. As it is, it covers 7 product areas and 49 items. In order to facilitate decision on product and investment, the directory provides inexhaustive list of addresses of suppliers of each profile.

6. The first edition enabled its users to have an insight into the production activity area of small-scale industries; the second and future editions will be able to give information on the practical advantages of small-scale industries, thereby further underscoring their invaluable contribution to industrial development process, particularly at the national level. It is hoped that the next revision of the directory will provide complete information on such components as product areas, product items, cost of production, sales proceeds, profit margin, turn over, rate of return and break even analysis.

7. The directory has drawn on various publications including statistical documents on machines, equipments and some finished products imported by African countries, as well as publications by countries which have proven experience in the field of small-scale industries development, such as India, China, Japan, the two Koreas, Brazil, etc. Experiences of some African countries have also been of great help, including information provided by various European, Asian and Latin American manufacturers of machinery and equipment to be used at small-scale level.

8. Comments, suggestions and inquiries are welcome as they would enable ECA to improve on the presentation of the directory in order to meet the demands of the user and help them contributing better to the programme of the development of the small-scale industries in Africa. Such comments, suggestions and inquiries should be addressed to:

Joint ECA/UNIDO Industry Division
Economic Commission for Africa
P.O. Box 3001
Addis Ababa
ETHIOPIA

CHAPTER I

BACKGROUND OF SMALL-SCALE MANUFACTURING ACTIVITIES

For the purpose of promoting self-reliant and self-sustaining industrial development, Heads of State and Government of the OAU adopted the Lagos Plan of Africa, and also endorsed a proposal that the period 1980-1990 be declared as an Industrial Development Decade for Africa. This proposal, supported by the Third General Conference of UNIDO held in New Delhi, India, was endorsed by UN General Assembly. In fact, by resolution 35/64 on special measures for the social and economic development of Africa in the 1980s resolution 35/66(b) the General Assembly formally proclaimed the years 1980-1990 as the Industrial Development Decade for Africa.

In order to implement the General Assembly resolution, the member States of the OAU and the ECA have drawn up a programme for implementation of the Industrial Development Decade for Africa. This programme was endorsed by the Sixth Conference of African Ministers of Industry held in Addis Ababa in November 1981 and adopted by the Eighth ECA Conference of Ministers in April 1982 in Tripoli, the Industrial Development Board of UNIDO in May 1982 in Vienna and the Economic and Social Council of the United Nations in July 1982.

The Sixth Conference of African Ministers of Industry has considered the development of small-scale, cottage and rural industries as one of the priority subsectors in the Industrial Development Decade Programme.

The promotion of small-scale industrial activities has been considered by the Third Meeting of the Conference of Ministers of African Least Developed Countries held in April in Addis Ababa as one of the measures for effective mobilization of domestic resources.

The promotion and expansion of small-scale industrial activities in different sectors, such as agro-based, basic engineering, capital goods, chemical, metallurgical and light industries could help provide the basic needs of population by using immensely the local resources. The items reserved for this subsector constitute one of the relevant and immediate solutions to provide African countries with the consumer basic needs, in the short period and at the low cost, in accordance with the framework of the proposals contained in the Industrial Development Decade Programme.

The contribution of small-scale sector to industrial development in Africa will be greatly enhanced once the scope of their activities has been determined, appropriate capacities, capabilities and supporting infrastructures developed, and basic information on their production made available.

In this connexion, the Economic Commission for Africa intends to provide African industrial small-scale entrepreneurs with the industrial project profiles on items reserved for exclusive production in the small-scale and rural industries.

The project profiles provide potential industrial small-scale entrepreneurs with information on basic requirements for the production process, the investment cost involved as well as the type of profitability that can be expected. They also constitute a technical reference regarding availability of raw material, machinery, production capacity and, where possible, parts, components and accessories and conditions of supply. The profiles also give an idea of the potential market for products.

CHAPTER II. ADVANTAGE OF ESTABLISHING THE MANUFACTURING SMALL-SCALE INDUSTRIES

Industrialized countries are adopting sophisticated technologies and mass production techniques in order to achieve the fullest advantages of economies of mass production. However, most of the African countries are faced with acute problems relating to inadequate availability of some or most of the essential inputs required for industrialization such as financial resources, skilled manpower, managerial personnel and professionals required for establishment and successful operation of plants, infrastructure facilities like electric power, water, suitable means of transportation of raw materials and finished products, inadequacy of national demands conducive to large-scale operations, communication bottlenecks and entrepreneurship.

Large and sophisticated industries for the production of capital goods, industrial machinery, fertilizers and products like computers, watches, machine tools, etc. need the above-mentioned industrial inputs in relatively larger measure apart from sophisticated process know-how and use of latest production techniques and technologies which are not available internally to the African countries. These factors are not conducive for establishing immediately such industries in most African countries during the present stage of development. Small-scale industries on the other hand, offer certain definite advantages like lower investments per unit output, higher employment potential per unit investment, shorter gestation periods and use of relatively simpler technologies of production which are relatively easier to procure either from within the country or other African countries and sister developing countries. In certain specific fields resort may have to be made to procurement to develop an industrial base and environment and ensure increased use of local entrepreneurship, raw materials, equipment, human skills, development of backward regions and offer the social advantage of more equitable distribution of the national income thus satisfying the aspirations of the masses. Faced with such circumstances, the strategy for industrialization for African countries, to be realistic and meaningful, has to be based on proper thrust of development of small-scale industries to produce goods which satisfy the day to day use of the common man. This does not preclude the endeavour to establish large-scale industries. What is most important is that products which can be manufactured in small-scale sector at reasonable costs and of good quality should normally be reserved for small-scale sector.

Small-scale industries have proved to be very effective in modernizing the economies of some developing countries particularly rural areas of such economies. When established in the rural areas, these industries tend to generate employment and income and therefore help to stream down rural urban migration and at the same time improve standards of living in these areas. Being usually labour intensive and accounting for more jobs per unit of invested capital, the small-scale industries are also centres for the development of semi-skilled manpower and indigenous entrepreneurial capabilities which are essential ingredients for industrialization. This has been the case in the industrially advanced countries like Japan, West Germany, United States as well as developing countries like India, Malaysia, the Philippines, Singapore and South Korea. About 90 per cent of the industrial establishment in West Germany have around 100 meaningless employees. They account for more than 30 per cent of the total employment in industry and contribute about 25 per cent of the industrial output.

In the United States about 275,000 out of a total of 300,000 manufacturing establishments or roughly 90 per cent have around 100 employees. They employ about 5 million persons or 30 per cent of total industrial employment. The value added comes to 40 billion dollars or 30 per cent of the total from all manufacturing establishments.

In Japan, where small-scale industries have played a major role for over a hundred years, small and medium-sized enterprises account alone in manufacturing for 99 per cent of the number of establishments, e.g. those with less than 30 persons represent 95 per cent, and those with four persons or less represent 59 per cent.

The small industries in Japan account 75 per cent of the number of workers and 55 per cent of the value added in that sector, the total number of enterprises being 570,000 and workers 10 million in all manufacturing establishments.

In India, small-scale industries are estimated to have been employing 80 per cent of the people and out of the total manufacturing activity, more than 50 per cent account for the small-scale sector and rural industries. Small sector in India accounts for 80 per cent of the total working force in industry, and 35 per cent of the entire industrial production. Once established small-scale industries encourage the growth of an integrated and interlinked industrialization in that such industries are major suppliers of ancillaries to large-scale industries and different kinds of arrangements for subcontracting can be developed within a country and also at the subregional level. If geared towards the production of components of spare parts equipment etc., these industries can stimulate the growth of other sectors namely food and agro-based, light industries, building materials, transport and communications and energy sectors.

In the African region, small-scale entrepreneurship has already established firm roots and is gaining ground. Its organized growth needs to be fostered and accelerated; most small-scale industrial entrepreneurs and potential ones are not in the position to embark on small-scale industrial activities without institutional assistance. It is necessary to strengthen their capacities to collect and make effective use of basic information relating to the types of products that can be manufactured by small-scale industries, production technology, equipment and their suppliers, manpower requirements, finance, marketing, etc.

For the purpose of reaching self-reliant and self-sustaining industrial development, it is extremely important at national, and subregional levels to identify the current products and those to be manufactured by small-scale industries and to formulate the projects suitable for small-scale production. The main criteria for identifying the products to be manufactured is the satisfaction of basic consumer needs, and use of local raw materials, particularly in rural and urban areas and marketability.

Since the programme for the implementation of the Industrial Development Decade for Africa puts emphasis on the promotion of resource-based and engineering core industries such as those processing locally grown agricultural products and producing basic engineering, capital goods, metallurgical and other light consumer goods, the following product areas have been selected in this first stage of assessment of products and process of small-scale production activities in Africa: food, leather, textiles, paper and paper products, wood, metal working, engineering products, building materials and rural household products.

CHAPTER III

INDUSTRIAL ESTATE AS INSTITUTIONAL INFRASTRUCTURE FOR RATIONAL PROMOTION OF SMALL-SCALE INDUSTRIES

1. Concept and objectives of industrial estates comprising a number of small-scale industries

The concept of industrial estates consists in the establishments of an agglomerate of small-scale industrial units with collective infrastructural facilities such as working sheets, power, steam, transport, bank, post office, canteen, etc. and with special arrangements for professional inputs in technical and financial fields and specialized services such as maintenance, shop, tool, room, etc. which an individual unit can ill afford. In addition the industrial estate can have highly professional cadre of personnel if the raw material procurement and marketing of finished products is done by a common agency or department.

Industrial estates serve as instruments for encouraging the establishment of modern small-scale units in view of their lower capital investment requirements and operational costs as compared to establishment of individual small-scale units. The industrial estates by virtue of their being a conglomeration can also be an internal service of technology and engineering assistance among the various units of the estate.

The Government of concerned authorities generally find it more convenient and economical to provide the assistance in the form of certain concessions and facilities applicable to small-scale industries established in industrial estates rather than to the individual units scattered far away from each other. The assistance is generally in the form of constructed industrial sheds with developed infrastructure and common facilities for maintenance, testing and training etc. at concessional rate either on hire or purchase.

The concept of the development of industrial estates is gaining ground due to certain inherent advantages over the establishment of such units on scattered basis. These advantages are: production on relatively small-scale with maximum economy ensuring more rigid quality standards of production, availability of high level technical and managerial expertise which individual small units cannot afford to have, common raw material procurement and marketing facilities thus making it possible to provide professionals in the field which individual units cannot afford individually. In certain cases, the industrial estates provide the advantage of inter-co-operation between various units in the industrial estates to use the end-products of one another. Industrial estates also help the countries to achieve the objectives like creating a climate for industrialization, development of backward areas and regions, industrialization of non-metropolitan areas, encouraging involvement of local personnel in the process of industrialization, creating a cadre of skilled and trained manpower and professionals in specialized fields thus forming a sound base for rapid industrialization process.

In order to derive maximum advantage from industrial estates and ensure their successful operation, it is essential that factors such as proximity to areas of ready availability of work force, raw material sources, consuming markets and developed infrastructure should be given due importance at the time of choosing a suitable site for an industrial estate from amongst the various alternative evaluated for the purpose.

2. Types of industrial estates and products range

There are various types of industrial estates according to the type of units included in them and generally they are classified into five types:

(i) General purpose of composite industrial estate

This is a general type of industrial estate and may include most of small and medium industries and no preference is shown for any particular industry. It is a collection of various types of industries selected on the basis of raw materials availability and demand etc. in the region;

(ii) Ancillary industry estate

This type of industrial estate is normally established in the vicinity of a large-scale industry and consists of small-scale units manufacturing components, parts and stores which cater for the demand of bought outs required by a large-scale industrial unit, e.g. ancillary estate for machine tools, automobile manufacturing unit, watch factory, etc.;

(iii) Single trade industrial estates

This type of industrial estate normally includes industrial units belonging to the same trade, e.g. leather goods, ceramic products manufacturing units, rubber and plastic based industries, fruits processing units, etc.;

(iv) Functional industrial estates

In which the functions of one industry are sub-divided among a number of small units located in one place, each functioning according to a co-ordinated manufacturing programmes, e.g. functional industrial estate for production of electronic components, castings, forgings, electroplating etc.;

(v) Industrial estates for purely export processing of goods

The wide variety of products which can be included for manufacture in these types of industrial estates is illustrated below:

(i) Agro-based industries

- Canning and preservation of fruits and vegetables; and processing of meats;
- Manufacture of biscuits and confectionery, chocolates, etc.,
- Distilling, rectifying and blending of spirits;
- Tobacco manufacture;
- Saw mill and wood products;
- Manufacture of edible oils;
- Solvent extraction plants;
- Vegetable and animal oils and fats;
- Rice milling plants.

(ii) Leather and leather-based industries

- Manufacture of footwear and other leather products; and other leather products;
- Tanneries and leather finishing plants.

(iii) Paper and paper-based industries

- Manufacture of pulp, paper and paper boards;
- Printing, publishing and allied industries.

(iv) Rubber and Plastic-based industries

- Manufacture of rubber and plastic products such as rubber pipes and tubes, rubber footwear, plastic cap cases, lunch boxes, etc.

(v) Chemical and chemical-based industries

- Basic industrial chemicals;
- Pharmaceutical products;
- Paints, varnishes, lacquers, etc.

(vi) Mineral-based industries including glass and ceramics

- Manufacture of glass and glass products;
- Manufacture of cement and ceramic products.

(vii) Metal-based industries

- Steel re-rolling mills;
- Electrical appliances;
- Repair of motor vehicles;
- Spare parts for automobile industry.

(viii) Electronic items

- Electronic components;
- Assembly of Radio and TV sets.

(ix) Ancillar industries

- Parts and components for electronic equipment, machine tools, watches, telephone industry, automobile industry, heavy engineering equipment and other such industries.

3. Steps involved in establishment of industrial estates

- (a) Identification of industrial opportunities through the preparation of project profiles or pre-investment indicators for specific projects keeping in mind the lower investment costs and operational costs and incorporating general data and information on such aspects as minimum economic size of operations, broad details of technology and production process, requirements of major raw metals, utilities and services, manpower requirements including technical and skilled work force, major production costs and other techno-economic parameters.

In order to prepare these profiles, data regarding cost of land, buildings and civil works, broad idea of cost of equipment and materials, costs of manpower for various categories of people, cost of raw materials, cost of water cost of approach road, cost of transportation of raw materials and finished products, cost of power, etc. shall have to be collected in order to arrive at realistic project information.

- (b) Identification of entrepreneurs for various industries. Once the entrepreneurs and industries have been identified it would be possible to design the Master Plan of the industrial estate for the country depending upon the number of units to be included in a particular industrial estate.

- (c) Selection of site for the industrial estate: The various data outlined in step (b) above shall have to be obtained for various probable sites and relative economies worked out in order to arrive at the most optimum solution. To this end due emphasis should be placed on development of backward regions and creation of employment in the region.
- (d) Development of a phased development programme for the establishment of various units in the proposed industrial estate in order to make most optimum use of the available resources.
- (e) Indication of the expected viability of each identified unit.
- (f) Analysis of the tender bids. Detailed negotiations with various bidders should be carried out and after detailed technological economic evaluation of the final bids, orders should be placed on the most suitable suppliers.
- (g) Detailed design of buildings and civil engineering works including working drawings. Preparation of tender papers, invitation of tender bids, selection of contractors, and issue of work contracts.
- (h) Preparation of detailed designs for services and utilities equipment outside the plant boundary limits, preparation of tender documents, evaluation of bids and placement of orders.
- (i) Preparation of detailed design for common facilities centre (incorporating tool room, maintenance workshop and training centre).
- (j) Project management services including preparation of time schedules for construction and erection works, monitoring and updating up schedules, programming of finance, manpower requirement and training, construction materials and equipment deliveries, inspection of equipment and supervision of construction and erection, start up, commissioning and initial operation of the plant and handing over of the plant after ascertaining that the units have achieved the guaranteed performance.

CHAPTER IV

FINANCIAL ISSUES

This chapter is in two parts. The first part; sources of finance outlines the main sources of finance from which an entrepreneur can turn. The second part, "Determination of profitability and selection of investments", discusses the concepts and methodologies used in determining profitability and investment priorities.

The profiles have thus avoided repeating ideas handled in this chapter particularly regarding source of finance and determination of profitability. Resource inputs, pricing mechanism and policies, distance from source of capital sales prices are but a few of the determinants in calculating profitability. These differ from country to country. An entrepreneur eager to proceed with determining viability of the project can with the help of the information in this chapter make the preliminary research and calculation peculiar to his case. If on the other hand, he needs further help this can be sought in the respective countries or from the author; United Nations Economic Commission for Africa.

A. Source of finance

The most important source of initial capital to finance a new project by an entrepreneur is his own personal savings. The entrepreneur should in addition explore other sources such as financial institutions. Towards this end, he should study his project thoroughly with special emphasis put on determining and demonstrating profitability and rate of return over the life of the project. His confidence in the project depends on the expected return and on his other sources of finances.

A successful product attracts wholesalers, retailers and middlemen. It also attracts speculators. The entrepreneur who ventures in the production of a new product can effectively negotiate advances from a wide range of interested businessmen including those enumerated above. If on the other hand the product has already been tried on the market and satisfied the clients in terms of prices charged, quality and quantity offered his bargaining capacity for further advances is that more enhanced.

A small scale industry needs imported or local raw materials. Suppliers of raw materials are equally interested in selling their products. Once they see that the entrepreneur has successfully achieved to produce a marketable product, the tendency is to supply him with raw materials with short-term credits. The amount of raw materials and the payment period depend on the negotiation between the entrepreneur and the suppliers of the raw materials. This required a strong personality on the part of the entrepreneur to convince the suppliers of the raw materials that his new venture is profitably functioning, and thus his business is an extension of their business.

Commercial banks are short term financiers. Transaction of the product is a very important indication to bankers. The turnover demonstrates the success of the business. The entrepreneur of a small scale industry must closely work with the bank. His exercise or presenting and acceptances of cheques has important bearing and implications. Post-dated cheques are preliminary credit facilities of finance. A successful entrepreneur is often tight in cash. It is at this stage that he has to resort to commercial banks to solve his problem of liquidity.

Entrepreneur of small-scale industries have the advantage of getting long-term loans from development banks. This because the effort of the entrepreneur is basically developmental. It is recommended in this note that the entrepreneur should use such source of finance effectively for the purchase of useful machinery and for the purchase of strategic raw materials. The fund should not be used for financing land and building which do not contribute directly and immediately to the value added.

A successful entrepreneur converts his enterprise into a share company. Shares are sold to investors. With proper planning the proceeds of shares will become an important source of finance for expanding a new-venture.

An entrepreneur can affiliate his small-scale industry with another bigger industry doing the same type of business. This is with the aim of raising capital and withstanding other market/ones including competition.

Finally to increase his working capital an entrepreneur could device discount rates for selected clients in exchange for cash advances for future delivery. Discounting is a good source of initial capital particularly during the early stage of an enterprise.

DETERMINATION OF PROFITABILITY AND SELECTION OF INVESTMENTS

A wide range of criteria have been suggested for choosing investment proposals. These criteria may be classified into two categories: non-discounting criteria and discounting criteria.

1. Non-discounting criteria:

- (i) Payback Period (PP)
- (ii) Accounting Rate of Return (ARR)

2. Discounting criteria:

- (i) Net Present Value (NPV)
- (ii) Internal Rate of Return (IRR)

I. NON-DISCOUNTING CRITERIA

1.1 Payback Period

The payback period of an investment is the period during which the net cash inflows from the project equal the initial outlay. If a project involves an outlay of US\$10,000 and its net cash inflows are \$2,500, 2,500 and 5,000 for the years 1, 2 and 3 respectively, its payback period is three years.

The payback period for an investment which has a constant annual cash inflow is simply equal to the initial outlay divided by annual cash inflow. For example, if an investment involves an initial outlay of US\$18,000 and its annual cash inflow is \$4,000, Its payback period is $18/4 = 4 \frac{1}{2}$ years.

The payback period for A is four years, the payback period for B is five years. A is preferred to B on the payback criterion despite a substantial inflow of \$6,000 associated with B in the sixth year.

This shortcoming of the payback criterion may result in investment programme which excludes long gestation investment projects which contribute to profitability over a long time and enhance the competitive strength of the business.

It is a measure to cash recovery, not profitability.

Suggestions: In view of the limitations of the payback criterion, it is suggested that this method be used with some modifications. Two decision rules based on this suggestion are given below:

- Accept a project if the specified period of payback is less than say four year and the total cash inflow is 200 per cent (let us say) of the initial investment.
- Accept the project if the payback period is say less than four years and the net present value is positive.

1.2 ACCOUNTING RATE OF RETURN (ARR)

The Accounting Rate of Return (ARR), also referred to as the average rate of return, has many variants due to differences in how it is computed. All the variants, however have two features in common: (i) use of accounting concepts in calculating benefits; and (ii) no adjustment for time value of money. According to its most popular version it is measured as:

Average annual accounting profit after taxes over the life of the project

Average book investment during the life of the project after depreciation.

Example. The ABC Company is considering an investment which involves an outlay of US\$10,000. Its expected life is 10 years; its expected salvage value after 10 years is nil. The expected profits after tax are as follows: US\$2,000 in the years 1 through 5, US\$1,000 in the years 6 through 10. Given this information, the ARR is:

$$\frac{\frac{2000 \times 5 + 1000 \times 5}{10}}{\frac{10000 + 0}{2}} = \frac{1500}{5000} = 30\%$$

According to the ARR method, investments are ranked in order of their ARR - the higher the ARR, the better it is. Investments whose accounting rate of return exceeds the cut off rate of return (which generally varies between 15% and 30%) selected.

Advantages: It is conceptually simple.

It makes use of accounting information which is readily available and familiar to businessmen.

Limitations: It is based upon accounting profit, not cash flow. It does not take into account the time value of money. An example may be given to illustrate this point. Suppose that an entrepreneur has two investment proposals, A and B, each requiring an outlay of US\$10,000. Both the proposals have an expected life of four years after which their salvage values are expected to be 0. The expected after tax profits and cash flows of these proposals assuming the use of straight line depreciation are as follows:

Year	US\$			
	A		B	
	Book profit	Cash flow	Book profit	Cash flow
1	2,000	3,250	500	1,750
2	1,500	2,750	1,000	2,250
3	1,000	2,250	1,500	2,750
4	500	1,750	2,000	3,250

Both the proposals have an ARR equal to 25%. However, project A because it provides benefits earlier is more desirable than project B.

II. DISCOUNTING CRITERIA

2.1 Net present value (NPV)

The Net Present Value (NPV) of an investment proposal is the present value of expected future net cash flows, discounted at the cost of capital, less the initial outlay.

$$NPV = \sum_{t=1}^n \frac{A_t}{(1+K)^t} - I \quad (1)$$

- In equation (1) NPV = Net Present Value
- A_t = Net cash flow for the year t (assumed to occur at the end of t)
- K = Cost of capital (bank interest on borrowed capital)
- n = Life of the project
- I = Initial outlay

Illustration: The ABC Company is considering a project which has the following expected net cash flow:

Year	0	1	3	4	5	6	7
Net cash flow	-100,000	10,000	20,000	30,000	30,000	30,000	40,000

The cost of capital for the ABC Company is 12%. The NPV of the above proposal is:

$$\begin{aligned}
 & - \frac{100000}{(1.12)} + \frac{100000}{(1.12)} + \frac{200000}{(1.12)^2} + \frac{300000}{(1.12)^3} + \frac{30000}{(1.12)^4} + \frac{30000}{(1.12)^5} \\
 & + \frac{30000}{(1.12)^6} + \frac{40000}{(1.12)^7} = \text{US\$15,610} \quad (2)
 \end{aligned}$$

According to this method, projects are ranked on the basis of their NPV. The higher the NPV, the more desirable the project is. Projects which have a positive NPV are accepted. Projects which have a negative NPV are rejected.

It should be noted that the NPV depends on the discount rate and the ranking of projects may not remain constant for all discount rates.

Advantages: It takes into account the time value of money and all the flows with the investment proposals.

Limitations: This method assumes that the discount rate k , is constant^{1/}. If k is likely to change the margin, the utility of this method is impaired. It must be remembered that the ranking of projects and their acceptability depend crucially on the value of k . If k is likely to change, the decisions may be incorrect.

2.2 INTERNAL RATE OF RETURN (IRR)

The Internal Rate of Return (IRR) is defined as the rate of discount which brings about equality between the present value of future cash flows and initial investment. It is the value of r in the following equation.

^{1/} Strictly speaking, this is not true because NPV can be calculated with varying discount rates too. This, however, is rarely done. For practical purposes, only a single discount rate is used in NPV calculation.

$$I = \sum_{t=1}^n \frac{A_t}{(1+r)^t} \quad (3)$$

Illustration: A project calls for an initial outlay of US\$10,000 and is expected to bring the following cash inflows over the next ten years: US\$1000, 1000, 1000, 2000, 2000, 2000, 3000, 3000 and 3000. Its IRR is the value of r which will solves the following equation:

$$10000 = \frac{1000}{1+r} + \frac{1000}{(1+r)^2} + \frac{1000}{(1+r)^3} + \frac{2000}{(1+r)^4} + \frac{2000}{(1+r)^5} + \frac{2000}{(1+r)^6} + \frac{2000}{(1+r)^7} + \frac{3000}{(1+r)^8} + \frac{3000}{(1+r)^9} + \frac{3000}{(1+r)^{10}} \quad (4)$$

Calculation of the value of IRR

To calculate the value of IRR, a trial and error method is used which may be described as followd:

1. Select an arbitrary value of r.
2. Calculate the value of the right-hand side (RHS) of the equation (3) with this value of r.
3. If the RHS is lesser than the left-hand side (LHS), reduce the value of r. If the RHS is greater than the LHS, increase the value of r. Continue this till the RHS is very close to the LHS (If the RHS and LHS become equal, steps (4) and (5) are not required).
4. When the RHS comes very close to the LHS and is slightly greater (slightly smaller) than the LHS, try a value of r obtained, at the end of step (3). With this value of r, the RHS is mostly likely to be smaller (greater) than the LHS.
5. Interpolate to find the value of r which will render the two sides more or less equal.

This procedure may be issustrated for the project cited above, equation (4).

1. Choose r = 8% initially.
2. The RHS with r = 8% is US\$12,243.
3. Since US\$12,243 is greater than US\$10,000, try r = 10%. With this, the RHS is \$11,018. Since this is greater than \$10,000, try r = 12%; than RHS is \$9,982 which is very close to US\$10,000.
4. Try r = 11%. With this, the RHS is \$10,418.
5. Interpolating, the value of IRR is $11\% + \frac{418}{436} = 11.96\%$

Advantages: It takes into account the time value of money. It makes sense to businessmen who want to think in terms of yield.

Limitations: IRR represents the yield on a sustained basis that the intermediate flows can be re-invested at the IRR of the project. Often, it may not be possible of a firm to re-investment intermediate flows at the IRP.

Remarks: It is generally agreed that the Net Present Value (NPV) and the Internal Rate of Return (IRR) of a project are the most satisfactory measures of its profitability. Therefore, discounted cash flow techniques should receive greater emphasis. They are theoretically superior and practically feasible. The use of these techniques compels a firm to "look ahead" which in itself has a significant payoff.

It should be noted also that the cost of capital is an important factor, the yardstick for judging the worthwhileness of investment opportunities. It is used for evaluating the NPV and determining whether the IRR is attractive or not.

III. COMPONENTS OF CASH FLOW

Cash flow is defined as the amount of money arising at a firm from sales and repaid debts, and net of the amount being spent.

Cash flows^{1/} associated with a project may be divided into three parts: Initial flows, operational flows and terminal flows. The outlay made in the beginning represent the initial cash flows. The cash flow arising out of operations of the project are operational cash flows. The cash flows resulting from the winding up of the project are terminal cash flows. Whereas the initial cash flows are usually negative, the operational and terminal cash flows are generally positive. These flows are measured in post-tax terms.

In estimating the cash flows of a project, the incremental principle and the opportunity cost principle must be borne in mind. According to the incremental principle only the changes in cash flows of the firm, as a result of adopting the proposed project, should be considered.

The development of relevant cash flows is illustrated with a few examples.

^{1/} The cash flow for a year is expected to occur at the end of it.

Example 1: An Entrepreneur is planning to manufacture a new product for which a new special purpose machine costing US\$20,000 and financed by long-term funds is required. In addition, \$5,000 of long-term financing is required for the working capital. The long-term requirement of \$25,000 would be financed as follows: \$10,000 of equity and \$15,000 of debt. Long-term debt would carry 12% interest. The product will be manufactured for five years. The machine will be depreciated 10% per annum according to the written down value method. After five years the machine is expected to fetch \$1,250. The incremental sales are estimated to be \$10,000 per year. The incremental cost of sales is estimated to be \$3,000 per year. The tax rate applicable to the company is 60%.

Table 1: Computation of the Cash Flows

US\$

YEAR	0	1	2	3	4	5
A. Fixed investment	20000					
B. Working capital	5000					
C. Sales		10000	10000	10000	10000	10000
D. Cost of sales excluding interest on long-term debt		3000	3000	3000	3000	3000
E. Interest on long- term debt		1800	1800	1800	1800	1800
F. Depreciation		2000	1800	1620	1458	1312
G. Taxable profit		3200	3400	3580	3742	3888
H. Tax		1920	2040	2148	2245	2333
I. Profit after tax		1280	1360	1432	1497	1555
J. Salvage value of fixed investment after tax						12086
K. Net recovery of working capital						5000
L. Net cash flow = I + F + J + K	(25000)	3280	3160	3052	2955	19953

Example 2: XYZ company is interested in finding the cash flow associated with the replacement of an old machine with a new machine. The old machine bought a few years ago has a book value of \$30,000 and it can be sold for \$30,000. It has a remaining life of five years after which its salvage value is expected to be nil. It is being depreciated annually at 10% (written down value methods).

The new machine costs \$100,000. It is expected to fetch \$60,000 after five years when it will no longer be required. It will be depreciated annually by 10% (written down value method). The new machine is expected to bring a saving of \$30,000 in manufacturing costs. However, investment in working capital would remain unaffected. The tax rate applicable to the company is 50%.

Table 2: Computation of incremental cash flows relating to long-term funds

YEAR	US\$					
	0	1	2	3	4	5
A. New Investment	-70000					
B. Saving in manufacturing cost		30000	30000	30000	30000	30000
C. Depreciation on new machine		10000	9000	8100	7290	6561
D. Depreciation an old machine		3000	2700	2430	2187	1968
E. Incremental depreciation on new machine (C-D)		7000	6300	5670	5103	4593
F. Incremental taxable profit (B-E)		23000	23700	24330	24897	25407
G. Incremental profit after tax		11500	11850	12165	12448	12703
H. Net incremental salvage value						50666
I. Net cash flow (E + G + H)	(70000)	18500	18150	17835	17551	67962

V. COMPUTATION OF COST OF PRODUCTION

In Table 1 above, cost of sales or cost of production consists of the cost of raw materials and intermediates, utilities and fuel, manpower, and factory overheads. It is computed as follows:

Table 3: Cost of Production

	Require- ments	Unit Cost	Total Cost	Bases of Estimation	Margin of Error
1. Raw Materials and Intermediates					
2. Manpower					
Unskilled labour					
Semi-skilled labour					
Skilled labour					
Supervisory staff					
Engineering staff					
Managerial Personnel					
3. Utilities and Fuels					
Power					
Gas					
Water					
Coal					
Fuel oils					
4. Factory overheads					
Rent					
Taxes					
Insurance					
Depreciation					
Repairs and Maintenance					
Stores and repairs					
TOTAL					

Table 4: Proforma Profitability Statement

A. Sales of goods and services
B. Cost of goods produced
C. Change in inventory
D. Cost of goods sold
E. Administration and general overheads
F. Selling and distribution expenses
G. Operating income before interest and taxes
H. Non-operating surplus or deficit
I. Earnings before investment and taxes
J. Interest
K. Earnings before tax
L. Tax
M. Earnings after tax

VI. BREAK-EVEN ANALYSIS

The break-even analysis is broadly defined by the relationship between output and cost and the break-even point in the volume where there is no profit and no loss.

Example: Let us use the following symbols

F = fixed costs

Q = quantity produced

V = Unit variable cost

S = Unit selling price

P = Profit = (Q x S) - F - (Q x V)

The break-even volume is the value of Q for which P = 0.

$$Q = \frac{F}{S - V}$$

CHAPTER V. PROFILES OF SELECTED ITEMS

The components included here are the components which constitute the main expenses for the small-scale manufacturing units. However, the estimates given are illustrative and will have to be adjusted according to the conditions in individual countries. The cost of the components such as raw materials, utilities, contingencies, land and personnel charges would depend on where and in which African country, the small-scale manufacturing unit is going to be established. The elements such as living cost, national financial and commercial legislations, regulations, restrictions, the rate of taxations, etc. mostly influence the cost of the above components.

The profiles are classified under the following product areas:

- A. Food products
- B. Leather products
- C. Textile products
- D. Paper and paper products
- E. Wood and wood products
- F. Metal and engineering products
- G. Building materials
- H. Rural household products

Product area A: Food Products

The significance of and continuing increase in food import bill in Africa, has been a matter of great concern. Over the last two decades, the food and agricultural situation has undergone a drastic deterioration—culminating in significant fall in average dietary standards below nutritional requirements. Not only has food production failed to meet population growth, but also losses of food during and after harvest have seriously reduced the amount of food available. These losses are due to late harvesting and inadequate techniques of preservation, transport, lack of storage and processing facilities. For example, it is estimated that some 580,000 tons of the total annual fish catch in Africa are lost every year in the absence of proper storage, handling and processing facilities. However, the small establishments are well adapted to the processing of fish and certain agricultural crops. In fact the following are the food products which can be produced at small scale level for the immediate and direct fulfilling of the needs of specialized markets, and for providing services directly to customers:

- | | |
|---|-----------------------|
| - rice milling | - fish meat |
| - bread | - fish paste |
| - dairy products | - fish sausage |
| - ice cream | - dry fish |
| - cream cheese | - vinegar |
| - jams and juices | - tea |
| - dehydrated vegetables | - animal feed |
| - biscuits | - vegetable and fruit |
| - confectionery | |
| - palm oil | - Soft drinks |
| - ground nut oil | - sugar |
| - sesame oil | - poultry feed |
| - flours from manioc
(cassava) and maize | - starch, etc. |

Since agricultural raw materials are the largest available in Africa, the production of the above items in preserved form at the small scale level can constitute the immediate solution to the food problems during the implementation of the Industrial Development Decade Programme for Africa. It is expected also that the promotion of small establishments for food production will provide rural employment and in that way contribute to the containment of rural-urban migration.

A.1. Biscuits making unit

Biscuits are consumed by all people of all ages at all times and they make a tasty and nutritious snack with tea or coffee. The biscuits making unit can be established in smaller towns, village and rural areas and it is expected to provide a good number of employment opportunities at different levels.

(a) Raw materials and accessories per month

Recepes for biscuits and cookies from composite flour consisting of wheat, rice and defatted are as follows (Technical Compendium, ECA)

<u>Ingredients</u>	<u>Parts</u>
Wheat flour	800
Rice flour	150
Defated soya flour	50
Fat	150
Sugar	300
Salt	10
Water	180
Baking powder	30

(b) Utilities per month

(c) Contingencies per month

(d) Fixed capital

(i) Land and building

- Land = 350 square metres
- Building (processing room, storage of finished goods and storage of raw materials) = 200 square metres
- Office and packing room = 50 square metres

(ii) Machinery and equipment

- One universal vertical mixer model - 20 fitted with 7/2 HP motor A.C.
- One sugar pulveriser machine beater 3 phase variable mech arrangement 75 to 100 kg capacity/hour

- One rotary biscuit moulding complete with motor and set of dies.
- One baking oven electrically operated capacity with thermostat control
- One baking oven locally erected with fire bricks (stand by)
- Baking pans, moulds and smaller gadgets
- Two delivery vans (cycles)
- One weighing scale - platform type 100 kg capacity

(iii) Various charges connected with machinery and equipment (10 per cent of cost of machines and equipment)

Minimum total fixed capital
(i + ii + iii)

(e) Process description

The raw materials are mixed together in a paste form. This paste is then transferred to a mixer for preparing the dough.

The dough thus prepared is brought to the biscuit moulding and cutting machine where dough gets a desired shape and size which is then passed on the oven for baking. The baked biscuits are cooled to make them crisp and then sent to packing office.

(f) Personnel - skills and labour requirements

Category	Number	Salary per month (USD)
Manager (chemist)	1	
Storekeeper (accountant)	1	
Purchases/salesman	1	
Skilled workers	2	
Unskilled workers	5	

Total salary and wages
Perquisites 15 per cent
of the salary

Total:

(g) Minimum total investment required to establish the unit

(i) Minimum total fixed capital

- Land and building
- Machinery and equipment
- Various charges connected with machinery and equipment

(ii) Minimum total working capital

- Raw materials
- Utilities
- Personnel
- Other contingent expenses

Grand total minimum capital investment requirement =

2. Sources of raw materials

As noted in the component of biscuits the main ingredients are locally available. Coffee and cocoa are good African raw materials for making biscuits. Like there is chocolate bars it is possible to try on coffee bars (slabs). Cheese is becoming an important ingredient in biscuit production. In the Mediteranean areas dehydrated fruits are blended in biscuit production. The entrepreneur must do the necessary exercise to reach a formulation.

Sources of raw flavours and additives

Harmann and Reimer - West Germany
Bush Bouke Allen Ltd., England
DOW International, USA
BAYER, Liverkusen, West Germany
AKRAS International, Vienna, Austria

A.2. BREAD MAKING UNIT

Bakery is one of the important and popular food processing units in all African countries. It provides nutritious breakfast and food to a large number of households in cities, towns and African villages. Bread consumption is increasing every day in Africa. In fact, bakery manufacturing units can be established in smaller towns, villages and rural areas of any African country. Such units can provide employment opportunities at different levels.

Information on baking

Sugar is used in baking as a nutrient for the yeast, as a means of modifying the bread's flour and as a contributor to the browning reaction necessary for crust colour.

Animal and vegetable fats and oils are used in baking foods to produce tenderness. Butter is the sole fat used in some of the more expensive baked food (bread). The shelf life of bread made of animal and vegetable fat is short because of prevalent rancidity.

Malted wheat flour can be used as an enzyme additive to break the starch down to maltose, which is an energy source for yeast during the early stage of gelatinization to improve volume and texture.

Mold inhibitors play an important role in extending the shelf life of soft baked foods. Vinegar is the most easily available and relatively cheap mold inhibitor....

Many varieties of fruits (fresh and dried) are used in flavouring bread. Various gums are employed as stabilizers in baking powder.

(a) Raw materials and accessories per month

- Wheat flour	17 tons
- Sugar	70 kg
- Salt	30 kg
- Shortening	300 kg
- Dried baker yeast	170 kg
- Vegetable fat	25 kg
- Mineral yeast food or dough conditioner	
- wrappers	

(b) Utilities per month

(c) Contingencies per month

(d) Fixed capital

(i) Land and building :

(ii) Machinery and equipment

- One floor shifter motorised
- One dough kneader motorised
90 kg/charge

- One dough moulding m/c caps 500
- One baking oven locally erected with bricks (stancly)
- One bread slicing and wrapping and saling m/c
- One baking oven electrically operated
- One baking pans, moulds, etc.
- One rack
- Office furniture and equipment

(iii) Electrification and installation (10 per cent of cost of machines and equipment)

Minimum total cost of machinery and equipment (ii + (iii)) =

Minimum total fixed capital (i + ii + iii) =

(e) Process description

It is recommended to knead all the ingredients together in the machine for the preparation of dough. At intervals of 40 minutes, the bowl is removed and mixed. The mixed dough is fermented for two hours ready for dividing. The dividing is done as per the size of loaf to be manufactured. The devided dough pieces are panned and kept for final processing. When the dough attains a particular raising, they are baked for 40 minutes at 420 degrees F. Baked bread is cooled sufficiently, sliced and then wrapped.

(f) Personnel (skills and labour requirements)

Category	Number	Salary rate per month
Manager (accountant)	1	-
Storekeeper	1	-
Clerk-typist/salesman	1	-
Baker	1	-
Skilled workers	3	-
Unskilled workers	3	-
Cycle boys	2	-
Total salaries		-
Perquisites 15 per cent		-
TOTAL :		

- (f) Personnel (skilled and labour requirements)
 - (g) Minimum total investment required to establish the unit
 - (i) Minimum total fixed capital
 - Land and building
 - Machinery and equipment....
 - Electrification and installation charges
 - (ii) Minimum total working capital
 - Raw materials
 - Utilities
 - Personnel
 - Other contingents expenses
- Minimum grant total capital investment requirement

2. Sources of Raw materials

Wheat is not yet the staple crop in many African countries. Maize, millet, sorghum, cassava and rice are in the diet of the African mass. The blending of wheat with the available indigenous cereals to form composite flour is highly recommended by food technologists and researchers.

Type of non-wheat substitutes used and possible level of substitution (%)

Millet	Sorghum	Maize	Rice	Cassava
15-20	15-20	20-25	25-30	20

seeds pounded to form pastes can be added to the doughs of the above recipes. This will increase the quality of the bread both in flavour, softness and appearance. The same way other grain oil seeds may be fried to achieve the same improved result (Technical compendium on Composite flours UN-ECA).

3. Sources of machinery and equipment and addresses of suppliers

(a) India

- (i) M/S Oriental Machinery supplying Agency, P-21, Mission Row Extension, Calcutta
- (ii) M/S Baker Co. (p) Ltd., Omrigar Building, Oppo. Crawford Market, Bombay-400 003.
- (iii) M/S Evr Fresh Products, Rambaug, Indore (M.P)
- (iv) M/S Nagpal Bros. (Regd.), 2789, Hamilton Road, Delhi 110 006.
- (v) M/S Mangal Engineering Works, Lahori Gate, Patiala
- (vi) M/S New Era Industries, Firozpur Road, Ludhiana

- (vii) M/S Semoni Industries, Hoshiarpur Road Jullundur City - Pb.
- (viii) M/S Verma Bros. Engg. Industries Rega Co. Ltd.,
12/4, Veer Nariman Road, Brady House, Fort,
Bombay-400 023.
- (ix) M/S Boady Morris Engg.

(b) Japan

- (i) Moritani and Co., Ltd., International Trading
and Engineering, 4-23, Yaesu 1-Chome, Chuo-ku
Tokyo. 103-91
- (ii) Fugi Machinery Co., Ltd. 14-10, 2-Chome,
Kamejima, Nakamura-Ky Nagoya 543
- (iii) The Yokohama Industrial Institute, Nihon -
Odori 11, nara-ku, Tokohama.

(c) Switzerland

- (i) Glatt, Masch. und Apparatebau AG, Kraftwerkstrasse
3, CH-4122, Patteln
- (ii) BAFAG, backofnenfabric, CH-35334, Signau.
- (iii) Sigg Aktien - Gesellschaft, Walzunhlestrasse 51,
CH-8500, Frauenffid.

A.3 EDIBLE OILS

Oil seed crops occupy an important position in the agro-industrial activities in most African countries. Most of the edible oils are produced from palm oil seeds, groundnut, etc.

The oil milling units are more labour intensive, need a lot of more unskilled labour and are much more divisible than their counterparts in basic and capital goods industries. The oil processing units can be set up in various sizes. The edible oil processing units can be set up as rural enterprises. Therefore, the oil processing unit offers a wide and viable field to promote occupation diversification in the villages and to expand and broaden the base of economic activity and thereby provide a bridge between agriculture and industry, rural and urban cultures and provide practical benefit to the population. It must be noted also that edible oil is an important raw material of soap and therefore the production of edible oil lead to the production of another liked product. The oil cake is also another important raw material for animal feed. The sale ability of oil cake has made the production of edible oil profitable and viable. Edible oil is convertable to margarine. This project profile relates to a capacity of fifteen tonnes per month.

(a) Requirements of raw materials and accessories
per month

(i) Palm kernels groundnuts and other oil seeds
according to local availability;

(ii) Gunny bags;

(iii) Plastic, tin containers;

(iv) Glass, bottles

(b) Utilities per month

(c) Contingencies per month

(d) Fixed capital

(i) Land and building

- Land: 350 square meters
- Building: 250 square meters,
- Working shade, storage room,
office and store

(ii) Machinery and equipment

- One oil expeller - crushing capacity
1 tonne per day;
- One 20 H.P. motor with starter switch,
gear, etc.;
- One small boiler with super heater;
- One filter press 16" x 18" plates
with plunger pump and filter cloth;
- Three oil storage tanks 200 kg capacity
- One weighing scale flat form
type 100 kg capacity

(iii) Various installation charges:

- Electrification and installation charges
(10 per cent of the cost of machinery and
equipment)
- Cost of tools, fixtures, belt and pulley ...
- Furniture

Minimum total fixed capital = (i) + (ii) + (iii) =

(e) Process description

After breaking the palm kernels or groundnut seeds to approximately 0.3 inches in size, the broken kernels seeds are fed into the press at a rate of 35 kgs/h. The oil content of the broken kernels seeds is reduced from 49 per cent to 17 per cent (65 per cent efficiency). Repressing the cake a second time at a throughput of 49 kgs/h reduces the oil content of the cake to 11 per cent (77 per cent efficiency).

The press can also be used for expelling the oil from whole or unbroken kernels. For a throughput of 60 kgs/h the oil content of the kernels is reduced to 22 per cent (55 per cent efficiency). It is noted that the machine takes about 5-10 minutes to reach a maximum throughput of kernels.

The filtered oil is neutralized with caustic soda. China clay is used to bleach the oil to give the product as much as possible transparency in colour. The oil may also be passed through a vacuum heater tank to be deodorized. Such production process will give the oil an acceptable quality standard both in terms of order and appearance.

(f) Personnel (skills and labour requirements)

Category	Number	Salary rate per month	Total
Manager (chemist)	1		
Store keeper (accountant)	1		
Mechanic	1		
Purchase/salesman	1		
Skilled worker	1		
Unskilled worker	4		
Total salaries and wages			
Perquisites, 15 per cent of the salary			
Total:			

(g) Minimum total capital investment required to establish the unit

(i) Minimum total fixed capital

(ii) Minimum total

- utilities
- other contingent
- personnel

Minimum grand total capital investment requirement

2. Sources of raw materials

The main raw materials from agricultural sources. Containers (glass, tin, plastic or bags) may be obtained from trade sources.

3. Sources of machinery and equipment and addresses of suppliers

Oil expellers are simple metal screws attached to a stand horizontally. The oil seeds are fed from above. The screw is run with a motor thus crushing and expelling oil from the seeds. Oil expellers are made locally practically in all African countries.

When making enquiries, please specify whether complete machinery and equipment or only some items of equipment are required.

U.K.

Simon Rosedowns of Hill, England, various capacities including MINI AD Expeller

India

- (i) Delhi Iron and Steel Co. (P) Ltd. G.T. Road, Post Box No.7, Ghaziabad (U.P.)
- (ii) Lyllpur Engg. Co. G.T. Road, Post Box No. 9, Ghaziabad (U.P.)
- (iii) P.S. Engg. Co. 7917 Latouche Road, Post Box 218 Kanpur (U.P.)
- (iv) The Punjab Oil Expellers and Co. Patel Marg, Ghaziabad (U.P.)
- (v) Punjab Engg. Works, 32, Rama Krishna Samadhi Road. Calcutta - 54
- (vi) Swastic Engg. Works, 198, Panjera Pole Road, Bombay - 4
- (vii) Sunstone Engineering Industries (P) Limited, P.O. Kuchaman Road - 341509 Rly. Stn Nawa City. District Nagour (Rajasthan)

Japan

- (i) Moritani and Co., Ltd. International Trading and Engineering,
4-22, Yaesu 1 - Chome, Chuo-Ku, Tokyo, 103-91
- (ii) Yuken Kogyo Co. Ltd., A Miyamae, Fujisawa, Kangawa pref.
- (iii) Ebara Manufacturing Co., Ltd., 11, Haneda Asahi -
Cho, Ota-ku, Tokyo
- (iv) "CECOCO" ChouBoeki Goshi Kaisha, 9-29, Matsugamotocho,
Ibaraki, Osaka.
- (v) Fuji M chineries Co., Ltd. 14-10, 2-Chome Kamejima,
Nakamuza-Ku, Nagoya 543

France

- (i) Establishments Olier, 63-Clermont-Ferrand, Bureaux: 12
Avenue George V, Paris 8ème
- (ii) Société des anciens établissements, Lhnilhier, 5, Rue Amedee-Bargy,
2-Dijon;
- (iii) Compagnie Hobart, 11, rue galilee, Ivory-Port (Seine);
- (iv) R; Desumles, 9, rue Paul Doumer, Aubervilliers (Seine)

Federal Republic of Germany

- (i) Borsing Aktiengesellschaft, 1 Berlin 27 (Tegel),
Postfach 12
- (ii) Krupp, Fried Harburger Eisen und Bronzwerke, 21
Kamburg - Harburg Postfach 105;
- (iii) Muller, Fritz Pressenfabrik, 73 Esslingen (Neckar),
Postfach 310
- (iv) Reinarts, Uathias Maschinenfabrik, 404 Neus, Postfach 137
- (v) Estraktions, Technik, Gesellschaft fur Anbagenbaumbh,
P.O. Box 7501447 D-2000, Hamburg 76 W.6.

A.4 FISH DRYER UNIT

Africa with its vast ocean and seashores, plenty of lakes and rivers must be able to use fish resources to feed its populations.

It is known that fish protein contains large amounts of amino acids which are important, indispensable, and nutritive substances for domestic animals as well as for human beings. In fact a fish meal containing a large quantity of amino acids is such an excellent livestock feed that hens fed on it lay sizeably a larger number of eggs; and the flesh of livestock improves in nutritive value too. Fish oil is also an important material for industrial soap, and the gravy can be concentrated and mixed with rice bran or wheat bran for use as livestock feed.

From past experiments, it has been well recognized that domestic animals such as the milk cow, store cattle, pig and poultry show remarkable results of rapid and better growth when fed with rice fish meal fodder, as it is known to contain high quantity of protein and phosphoric acid. For feeding chicken in poultry farms, the fish meal fodder is most suitable.

(a) Raw material requirements, intermediates and accessories
per month:

- (i) Fish about 50 tons/day
- (ii) Bags
- (iii) Tin containers, etc.

(b) Utilities per month:

(c) Contingencies per month:

(d) Fixed capital

(i) Land and building

- Land 3,000 square metres

Construction of the unit consists of:
steel frame, lower part, concrete block,
upper part, mortar finish on metal,
bathing recruitment is floor space =
1,320 square metres

- Building (storage, processing,
packaging and office areas)

(ii) Machinery and equipment

- Transport car
- Fish tray
- Pre dryer
- Dryer
- Rail
- Blower
- Oil burner
- Electric motor

(iii) Various installation costs

- Electrification and installation charges (10 per cent of the costs of machinery and equipment)
- Other costs.....

Total :

Minimum total cost of machinery and equipment
(ii) + (iii)

Minimum total fixed capital
(i) + (ii) + (iii) =

(e) Process description

It is recommended to ensure not only uniform but specifically more than enough ventilation. Preliminary drying is liberally to help prevent the materials becoming steamy or scorched during drying. The hot air generator is used and then the fumes will be exhausted outside through the chimney. Being free from fire, the materials will not be infected with the smell of heavy oil. The temperature, wind force, quantity of circulating hot air can be adjusted depending upon the types of fish and various operating conditions. There are three drying processes which give the most suitable conditions, namely :

- (i) Preliminary drying by normal temperature and strong wind;
- (ii) Drying by hot air of low temperature;
- (iii) Drying by hot air of high temperature

The hot air blows upon the surface of the materials placed on the transfer car. The transfer car is easy to operate and the whole unit is easy to handle. The transfer car can also be automatically moved from place to place as occasion requires by a time switch. The availability and kinds of materials (fish) and operation costs determine the suitable drying method to be used.

(f) Personnel (skills and labour requirements)

Function	Number	Salary rate per month	Total
----------	--------	--------------------------	-------

Manager	1		
Storekeeper (accountant)	1		
Fishermen	2		
Purchaser	1		
Driver	1		
Mechanic	1		
Skilled worker	1		
Unskilled worker	4		

Total salaries and wages :

Perquisites, 15 per cent of the salaries :

Total :

(g) Minimum total capital investment required to establish the fish dryer unit

- (i) Minimum total fixed capital
- (ii) Minimum total working capital

 - Raw materials
 - Utilities
 - Personnel
 - Other contingent expenses

Minimum grand total capital investment requirement:

2. Sources of raw materials

The raw materials are available locally, namely: fish from lake, river, sea.

3. Sources of machinery and equipment and addresses of suppliers

(a) Japan

- (i) Yanagiya Machinery Works Ltd., 1-Chome, Shinten-Cho, Ube, Yamaguchi-pref
- (ii) Maruo Trading Co. Ltd., Otori, Bldg., 2, 2-Chome, Nihombashi Tori, Chuo-Ku, Tokyo
- (iii) "CECOCO" Chuo Boeki Goshi Kaisha, 9-29 Mabsugamoto-Cho, Ibaraki, Osaka-pref
- (iv) Moritani and Co. Ltd., International Trading and Engineering, 4-22 Yaesu 1-Chome, Chuo-ku, Tokyo 103-91

A.5. FRUIT PROCESSING

Fruits are perishable agricultural products and therefore encounter a big percentage of damage. It is to combat such damage that preservation of fruit products becomes important.

Fruits are important garden food products. Horticulture has become a modern agricultural activity because fruit is gaining importance in the diet of the African population.

Fruits are also becoming important foreign exchange earners. African soil and climate are very conducive to the production of fruits. A big percentage of fruit harvest is spoilt because of lack of facilities for fruit preservation/processing.

African farmers of fruits are not equiped with cold storage facilities. Climates easily destroy fruits. Therefore the most appropriate approach in such instances is to immediately convert the fruits into industrial products by processing them when they are fresh. In extreme cases, to save the decaying of fruits, the fruits are crushed and fermented to produce local beverage.

All fruits are convertible into jams. However we have selected in this study orange as our raw material because it has more pectin content than the rest. Pectin is an important chemical ingredient in the production of preserves.

Production

Fruit preserves are mixture of cooked fruits and sugar. Marmalade and jam are the most popular marketable fruit preserves.

Sugar and fruits are the main raw materials.

Imported raw materials like jam colours, pectin and citric acid make up less than three per cent of the whole component.

Packing

Jam is packed in 450 gms. to 1 kg tin containers. This requires the use of complete set of machinery of can making. The final product jam in tin containers will have to be kept in refrigerated place which the African consumer lacks.

Glass jars are the most preferred containers for packing jams.

Process

Raw materials are prepared according to the following formulation.

Sugar	50%	by weight
Fruits	47%	
Pectin	2%	
Citric acid	1%	

100%

The fruit is cleaned and chopped to pieces. Using the above proportion 47 per cent by weight sugar is added to the fruits. The mixture is heated slowly to a temperature of 100°C for ten minutes.

It is cooled to 40°C and pectin is added to give the product solidity and transparence. Citric acid to the proportion of one per cent is added to preserve the product from deterioration and to balance the sugar taste which is too sweet. Then the final mixture is filled in glass bottle and allowed to cool.

The production of jam can be exercised at household level.

Its profitability is certain because prices of jam in any part of Africa is twice the price of sugar and orange which make 97 per cent of the component.

2000 glass bottles (450 mgs.) per month Capacity

Initial investment

Aluminium pot
Stove (burner)
Filler, table, weighing apparatus etc. ...
Operational capital

Total initial capital :

Cost of 2000 glass bottles ateach

Cost of sugar (225 x 2000)
450 kgs. x

Cost of oranges (225 x 2000)
450 kgs. x

Pectin, citric acid and colour

Total material cost :

Cost of production (gas, water..).....

Total cost of production :

Source of machinery and chemicals

Production of jams, marmalade and fruit preserves requires hygenically kept mixings pots. Boiling pots must be stainless steel. Aluminium pots can be used as alternatives. Locally made seaming machine is adequate. Chemicals like citric acids are easily available in chemical stores.

A.6. PROCESSED VEGETABLES

Vegetable farming is essentially a rural activity but large scale consumption of the products depends upon the urban market. The economy of vegetable farming can be improved through the local processing of some of the vegetables. The shelf-life of processed vegetables is longer than that of fresh vegetables and transportation is easier. Local processing will also overcome the practical problem of storage of fresh vegetable and their perishability.

This profile deals with the processing of vegetables by dehydration and their marketing in packed condition. The capacity proposed is 6 tones per month.

The availability of electric power for the project is assumed.

The operations can be carried out as a women's cooperative.

(a) Raw material requirements par month

The raw materials (aubergines, goud tomato, cauliflower, radish, peas, beans, carrot, cucumber, etc.) And even dry vegetables like potato and onions may be selected according to availability. Garlic is gaining importance in medicine. In countries like India (Rainboxy's Garlic Pearls) garlic is processed into tablets. The fillers are gum arabic and glucose. The vegetables are processed individually and marketed.

The raw materials required are:

- various vegetables
- chemicals, preservatives, and flavours
- packing materials (laminated paper, plastic or aluminium bags)
- strawboard cartons
- labels

(b) Utilities (per month)

(c) Contingencies (per month)

(d) Fixed capital

- (i) Land and building
 - Land 500 square metres
 - Building 300 square metres

(ii) Machinery and equipment:

- Storage bins
- weighing machines
- spray tanks for washing and cleaning
- driers (conveyor or tray driers)
- skin peeling machines
- de-shelling machines
- slicing machines
- assorted equipment like trolleys, trays, vessels, bins, tools
- electric motors and accessories
- office equipment and furniture

(e) Process description

The vegetables are spray-washed to remove dirt and impurities, cleaned with disinfectant chemicals and dried. Depending on their category, the vegetables are then skinned or deshelled, sliced and shredded. They are then subjected to a low dehydration at a low temperature (145 to 190 degrees farhenheit) in a furnace in closed containers, the dehydration time varying from 2 to 12 hours. Then they are passed through a cooling chamber to vaccum and sealing for marketing.

(f) Personnel (skills and labour requirement)

Function	Number	Salary rate per month	Total
Manager cum food chemist	1		
Accountant cum storekeeper	1		
Purchase/sales assistant	1		
Office secretary/typist	1		
Skilled workers	6		
Semi-skilled workers	6		
Unskilled workers	8		
Total			
Perquisites, 15% of salaries			
Total			

(g) Minimum total investment required to establish the unit

(i) Minimum total fixed capital

- land and building
- Machinery and equipment

(ii) Minimum total working capital (S)

- Raw materials
- Utilities
- Personnel
- Contingencies

Total

Grand total

2. Sources of raw materials

The raw materials, being fresh vegetables, may be procured locally from the rural sources of farming.

Preservative and flavouring chemicals and packing materials may be purchased from trade sources. The Chamber of Commerce and Industry in respective countries may be contacted for information on sources of supply.

3. Sources of machinery and equipment and addresses of suppliers

Canada

Canners Machinery Ltd., SIMCO, Ontario
Blakeslee GS & Co. of Canada Ltd., Scarborough, Ontario
Hobart Manufacturing Co., Ltd., The Don Mills, Ontario

Czechoslovakia

The Czechoslovak Chamber of Commerce and Industry
Argentinska, 38, 170 05 Prague 7

Federal Republic of Germany

Hans Binder Maschinenfabrik, Isarstr 6-8, 8051 Marzling bei
Freizing

Paul Kunz and Co., GmbH, PKC-Maschinenfabrik, 5419
Dottlesfeld/Westerwaid

Maschinenfabrik August Herbert GmbH
Postfach 3829, 3300 Braunschweig

Zimmermann and Jansen GmbH, Postfach 545, 5160 Duren

Fryma - Maschinenbau GmbH, Postfach 1340
1788 Rheinfelden (Baden)

SGZ Analgenbau GmbH
Postfach 2127, 6380 Bad Hombourg V.D.H.

German Democratic Republic

Fortschritt Landmaschinen Export-Import, DDR-1185 Berlin,
Bruno-Taut-Strasse 4

Hungary

Komplex, Népkoztársaság Utha 10, Budapest VI

India

Chemid (India)

Madanlal Nagar, 347 Grant Road, Bombay

Rayon Metal Works, 293 Bellasis Road, Bombay 8

Armstrong Smith Ltd., 1 Sir P. Mehta Road, Bombay 1

McNeill and Nagor Ltd., 28 Barakhamba Road, New Delhi 1

Gladway and Co., 251, Hornby Road, Fort, Bombay-1

National Small Industries Corporation, Near Okhla Industrial
Estate, New Delhi 110020

Japan

Japan Consulting Institute
1-1 Yuraku-Cho, Chiyoda-ku, Tokyo

Korea

Korea Trade Promotion Corporation,
P.O. Box 1621, Central Seoul

Sweden

Tetra-Pak International AB, Lund
AB Akerlund and Rausing Lund

Arenco AB, Kalmar

AB Iwema Pack, Goteborg

Switzerland

Motor AGI, Postfach, CH-6034 INWIL
Goethe Ernest, Ygrubenstrasse 2 CH, 8750 Glarus

A.7. RICE MILLING

In Africa, rice is one of the important cereal crops. Its increasing consumption requires the establishment of more rice milling units in order to increase the availability of rice in the years to come.

In fact, rice milling is an age old activity which now qualifies for being looked upon as an industrial unit. The production activity of rice has been developed from simple hand pounding, foot pounding, hulling and dehusking by emery disc shelters to the latest methods involving dehusking by rubber roll shelters and polishing by modern mechanical techniques.

There are single hullers, rice mills and shelter cum hullers operating in the most African countries. Nevertheless, considerable losses in the form of broken rice and other by products take place when paddy is milled through huller and shelter mills.

Due to constraints of capital availability, several African rice producers are not able to modernize their units. The objective of this rice milling profile is to incite the producers of rice to set up a modern mill unit consisting of rubber roll shelter for dehusking, a cone polisher or huller for polishing and other accessories such as paddy cleaner.

(a) Requirements of raw materials and accessories
per month

- paddy
- sacks/bags

(b) Utilities per month

(c) Contingencies per month

(d) Fixed capital

(i) Land and buildings:

Land = 800 square metres
Buildings = 250 square metres
(shed, office and stores).....

(ii) Machinery and equipment

- One paddy cleaner
- One modern mini mill capable handling 500 kg paddy 1 hr. with screw press without motor
- One TEFC squirrel Cage Motor of 15 HP x 1,440 x RPM
- One Huller for polishing rice with a handling capacity of 500 kg/hr
- One elevator
- One platform type weighing machine

- (iii) Electrification and installation
Charges (10 per cent of the cost of
machinery and equipment)

Minimum total fixed capital:
(i) + (ii) + (iii) =

(e) Process description

The paddy is cleaned in a paddy cleaner to get rid of the foreign matter, such as mud, stones, chaff, etc. The cleaned paddy is fed into dehusker, a moderne mini mill, where it is dehusked with the help of rubber roller and is separated from the husk. The brown rice with a small quantity of paddy is next fed into a huller where polishing of rice is done by mild friction created within the polishing chamber of the huller. The resulting polished rice and bran are separated and collected separately.

(f) Personnel (skills and labour requirements)

Category	Number	Salary per month
Manager (owner)	1	
Accountant-cum-clerk	1	
Mechanic	1	
Watchman	1	
Casual Unskilled workers	5	
Total salaries and wages		
Perquisite 15 per cent salaries and wages		

Total:

(g) Minimum total investment required to establish the unit

- (i) Minimum total fixed capital
- Land and building
 - Machinery and equipment
 - Electrification and installation charges
- (ii) Minimum total working capital
- Raw materials
 - Utilities
 - Personnel
 - Other contingent expenses

Minimum grand total capital investment requirement

2. Sources of raw materials

The raw materials are available locally

3. Sources of machinery and equipment and addresses of suppliers

When you make enquiries, and in order to satisfy your requirements, please indicate if you would like to receive complete machinery and equipment or only some parts.

Machinery for rice milling can be locally produced. Basic equipments like electric motors can be imported. However many African countries have resorted to local production of rice milling machines. It is absolutely recommended therefore to use local indigenous metal workshops to design and produce the milling machines according to the specified capacity.

(a) India

- (i) Binny Engineering Works Ltd., P.B. 1111
- (ii) Meenambaan, Madras, 600061
- (iii) G.G. Bandakar Machine Works Ltd., Bhiwandi, Thana (dt), Maharashtra
- (iv) Geckey Engineering Industries, Kashmir Road, Batala, Punjab
- (v) Sree Rama Engineering Works, Transport, Vijaywada 1, Andhra, Pradesh
- (vi) Kisan Krishyantra Udyog, Collector Ganj, 54, Moti Bhavan, Kanpur-1

(b) Japan

- (i) "CECOCO" Chuo Boeki Goshi Kaisha, 9-29, Matsugamoto - Cho, Ibaraki, Osaka
- (ii) Chuo Boeki Goshi Kaisha, P.O. Box 8, Ibaraki City, Osaka, 567
- (iii) Fuji Machineri Co. Ltd., 14-10 2-Chome, Kamejima Nakamura - Ku, Nagoya 543

Switzerland

- (i) Bumler AG Gerbruder Masehinenfabrik, CH-9240, Uzwil
- (ii) Dauerio AG, Heinrichstrasse 217, CH-8081, Zurich

A.8 YEAST AND BAKING POWDER

Bread is the most essential commodity and therefore its components baking powder and yeast are very important items. Importation of baking powder and yeast involves timing for delivery. Any delay of delivery of baking powder and yeast means delay of baking. Bread is a product which must be supplied continuously. It is not like any other commodity where allowance can be given to the disruption of supply. Therefore to have baking powder and yeast produced locally is absolutely indispensable.

Modern bakeries which supply bread to the public (schools, hospitals, restaurants etc.) cannot function without yeast and baking powder. The baker must know the consti-
tution of yeast and baking powder very well because the quality of the bread depends on these two important ingredients. He must be able to observe the reactions of the yeast and baking powders at varies level of blending of different types of flours. Composite flour which is 80 % wheat flour mixed with 20 % maize, millet or sorghum is being popularized in Africa to produce bread. Composite flour requires correct proportion and application of baking powder and yeast.

The purpose of yeast in bread making is to fasten the period of fermentation of the dough. This additive is mostly used in the proportion of 0.25 per cent to = 0.50 per cent of the flour weight or 250 grams to 500 grams per quintal of flour.

Yeast consists of calcium salt, amonium salt and oxidizing agent. A popular yeast has the following formula :

Calcium sulphate	-	30.0 %
Amonium chloride	-	9.4 %
Potassium bromate	-	0.3 %
Salt	-	35.0 %
Starch (flour)	-	25.3 %
		<hr/>
		100.0 %

The starch is used as a filler making the mixture a homogenized lot.

Baking powder

The wise baker knows the clear difference between yeast and baking powder. As above mentioned, the presence of yeast is to fasten the period of fermentation of the dough. A batch of dough can ferment without a yeast through the surrounding bacteria. It may take two to three days depending on the temperature and other factors. The grade of fermentation therefore oscillates making the quality of the dough most irregular. However, using a standard yeast results in standardly fermented dough.

Baking powder is a food chemical used in baking to leaven the mixture of flour and water. The addition of baking powder leavens the dough, making the dough bigger in volume and lighter in weight. The baking powder produces carbon dioxide in the dough making it easier for baking.

Production of baking powder

Modern baking powder consists of mixture of sodium bicarbonate, one or more acid ingredients, and inert ingredient which serves to keep the re-active components physically separated. The inert ingredient is usually starch dried to 5.7 per cent moisture. No other material has been able to substitute for starch, either as a result of less affinity for water or for economic reasons.

Sodium bicarbonate (baking soda) is a common factor in all chemical leavening systems. The use of a proper balance of soda ash and baking acid will result in an essential neutral product. An excess of soda ash will result in an alkaline condition imparting and undesirable soapy flavour. An excess of acid will impart a bitter or a tart taste.

Formulation for baking powders both for commercial and for household use

<u>Constituents</u>	<u>Commercial</u> (1)	<u>Baking</u> (2)	<u>Powder</u> (3)
Soda, granular	30.0	30.0	30.0
Monocalcium phosphate Monohydrate, MCP	5.0	5.0	5.0
Starch dried	24.5	26.0	27.0
Sodium aluminium Sulphate - SAS	-	-	-
Sodium acid Pyrophosphate SAPP	38.0	44.0	38.0
Calcium Sulphate	-	-	-
Calcium Carbonate	-	-	-
Calcium lactate	2.5	-	-

Machinery

Stainless steel or locally made aluminium heavy duty vessel with high speed agitator

Weighing apparatus

Automatic filling machine locally made

Seaming machine locally made

Total fixed capital :

Operational capital :

Total capital layout :

Monthly production of 10,000 kgs. at/kg

Sales

Profit margin of 30 per cent monthly profit

Monthly net profit 20 per cent taxes deducted

Annual profit (six months working period
because of foreign exchange problem).....

Rate of return = %

Please note that the market capacity for yeast and baking powder is estimated to be more than 10 tons monthly each in any African country.

Notation

The same machines and apparatus can be used to produce both yeast and baking powder.

PRODUCT AREA B: LEATHER PRODUCTS

Even in old times leather products were useful. However improvements in leather technology has increased the usefulness of leather products. Leather goods are used as follows:

- (a) Leather shoes;
- (b) Leather shoe uppers;
- (c) Leather sandals;
- (d) Leather purses and hand bags;
- (e) Boots, garments, sport outfits, harness;
- (f) Leather goods used for such industrial purposes as belts, packing, spinning and weaving machinery parts.

Approximately 70 per cent of all leather goes into the manufacture of footwear. The remaining 30 per cent are used for other products. Leather footwear and leather garments are one of the most favoured consumer articles with increasing demand. The annual per capita consumption of leather footwear in a number of developing countries is far below unity. Though remarkable progress is being experienced in the rising consumption level of footwear in a number of developing countries, it would call for a vast economic improvement and hence tremendous increase in the real per capita income in order to increase consumption to the level of developed countries.

An assessment of the prospects of the leather industry in Africa shows that about 433 and 1,463 million square feet will be consumed within Africa, via footwear only in the years 1985 and 2000 respectively.

African countries must gear their leather industries towards exploiting the growing domestic market for footwear. In this connexion, what is called for is organizing and promoting small-scale and cottage type of leather footwear production.

B.I LEATHER PURSES AND HANDBAGS

The demand for purses and handbags is multiplying day by day in Africa. These important fashion items are widely consumed by ladies and men. Attractive designs, different sizes adapted to the client requirements, both ladies and men and good selection of material used for the end product hand bags, make the scope of its manufacture widened in the African countries. The indigenous availability of raw materials and skilled labour offer an important scope for the development of manufacture of leather purses and handbags in Africa. It is a labour oriented industry and can be set up in any part of the African rural areas.

Accessories to leather purses and handbags must be made locally. These component are decisive for marketing. Blacksmiths and Silversmiths are good source of supply.

This project profile relates to a production capacity of:

Handbags: 7,500 pieces per annum

Purses: 7,500 pieces per annum

(a) Raw material requirements per month (US\$)

- (i) Lining leather;
- (ii) Chrome leather;
- (iii) Zip and other fittings.

(b) Utilities per month

(c) Other contingencies per month

(d) Fixed capital

(i) Land and building

- Land (rented) = 150 square metres
- Building (rented) = 100 square

(ii) Machinery and equipment

- Industrial sewing machines;
- One clicking press hand operated
- One stamping machine (HP 0.33)
- One skiving machine (HP 0.33)
- Tools and accessories.
- Office furniture and working tables.

Minimum total fixed capital (i) + (ii)

(e) Process description

It is recommended to cut the patterns according to the samples for cutting various leather components. The cut leather components are then skived, beaded and then closed. A suitable lining is stitched and attached with the leather bag or the purse to fit in properly. Where zips and other fittings are to be used, the same is done during process as and when desired.

(f) Personnel (skill and labour requirements)

Category	Number	Salary rate Per month	Total
Manager	1		
Accountant/clerk	1		
Mechanic	1		
Storekeeper	1		
Skilled labourers	5		
SUB-TOTAL			
Perquisites (20 per cent of salaries)			
TOTAL			

(g) Minimum total capital investment required to establish the leather purses and handbags manufacturing unit

- (i) Minimum total fixed capital
- (ii) Minimum total working capital
- Raw materials
- Utilities
- Other contingent expenses
- Personnel

TOTAL

3. Sources of raw materials

The lining leather, chrome leather, zips and other fittings are often available locally on the national markets (indigenous or imported).

4. Sources of machinery and equipment and addresses of suppliers

India

- (i) SP Engg. Works, Daya Bagh Road, New Agra;
- (ii) Benson Industries, 96, Sri Arbinco Road, Salkio, Howrah;
- (iii) Bata India (P) Ltd., Batanagar, 24 Parganas, West Bengal;
- (iv) A.C. Mitter and C., Mitter House, 71, Ganesh Chandra Avenue, Calcutta-13;
- (v) Perfect Machine Tools and Co., 6, Sir Phiroz Shah Mehta Road, Bombay-1;
- (vi) Francis Klein and Co., Ganesh Chandra Avenue, Calcutta-13;
- (vii) National Engg. Works, New Nagpada Road, Opp. Hospital, Bombay-8;
- (viii) Singer Sewing Machines Co. Ltd., Mount Road, Madras-2;
- (ix) Indi. Sewing Machines Co. (P) Ltd., 1/23B, Asaf Ali Road, New Delhi-2;
- (x) Indo German Shoe Machines Co. Pct. Ltd., 107, Kandivli Industrial Estate, Kandivli (West) Bombay-67;
- (xi) Redstar Engineers, D-55, N.D.S.E. Part 1, New Delhi-49;

Japan

Moritani and Co. Ltd., International Trade and Engineering, 4-22, Yaesu 1-Chome, Chuc-ku.

Switzerland

Kueny Werner Spezialmaschinenbau, Heiligholzstrasse 8, CH-4142, MUNCHENSTEIN.

Federal Republic of Germany

BMD BADISCHE MACHINENFABRIK DURLACH GMBH, P.O. Box 410140 D-7500 Karlsruhe 41.

B2. LEATHER SANDALS

Sandals are made in different forms and they are for protecting the foot. The sandals are used in Africa by villagers, farmers, common people of urban areas and also by other people. In most hot African countries, sandals have become an item of fashion and also form a part of dress. To cope up with the requirement of different users, sandals can be made with different types of materials and by different manufacturing processes. One of the manufacturing processes is Cemented Construction. This project profile relates to a production capacity of _____ per month.

(a) Raw material requirements per month

- (i) Upper leather chrome;
- (ii) Lining leather;
- (iii) Insole (leather/rubber)
- (iv) Grinerles;
- (v) Packing materials.

(b) Utilities per month

- Power

(c) Other contingencies per month

- Rent
- Postage
- Stationery
- Repairs and maintenance
- Transport charges
- Consumable stores
- Advertising and publicity
- Others

(d) Fixed capital

- (i) Land and buildings
- (ii) Machinery and equipment

- Strap cutting machine with 300 mm (hand operated)
- Upper serving machine (treadle operated)
- Cement air press, 2 bed (treadle operated)
- Double ended buffing machine, with exhaust motor, 1 HP.
- Trade mark embossing machine, with heating device
- Tools and equipment
- Wooden lasts
- Office equipment/furniture, etc.

- (iii) Electrification and installation charges
(10 per cent of cost of machines and equipment)

TOTAL FIXED CAPITAL (i) + (ii) + (iii)

(e) Process description

As per graded pattern of various sizes for both upper and bottom, the components are cut and supplied to the closing and making sections respectively. In the closing section, the edges of the skived uppers are stitched. After the completion of stitching operation, decorative treatment on the upper such as punching, fixing of buttons, metal fittings, etc. are done either by hand or machine. In the making section, the straps of the upper are inserted in the slots of insoles. The inserted portion of the strap and its corresponding portion (the flesh side of the insoles) are roughened and cemented. Finally the flesh sides of both the insole and bottom soles are roughened and adhesive is applied. The cemented soles and insoles are stuck and pressed in a cementing press to make the bond permanent.

The next operation is finishing in which the edges of the sole and heel are trimmed, inked and set on the machine or by hand. The upper is cleaned and dressed before packing into the boxes.

(f) Personnel (skills and labour requirements)

Category	Number	Salary Rate Per month	Total
Supervisor/owner	1		
Designer	1		
Mechanic (operator)	1		
Accountant/clerk	1		
Skilled workers	2		
Semi-skilled workers	5		
SUB-TOTAL			
Perquisites (20 per cent of salaries)			
TOTAL			

(g) Minimum total capital investment required to establish the unit

- (i) Minimum total fixed capital
- (ii) Minimum total working capital
- Raw materials
- Utilities
- Other contingent expenses
- Personnel

TOTAL

2. Sources of raw materials

In most African countries, the raw materials are available locally. In the other African countries, the governments provide the manufacturers of leather sandals with facilities to import directly part of raw materials. In any case, it is recommended to contact the Chamber of Commerce or Industry.

3. Sources of machinery and equipment and addresses of suppliers

India

- (i) SP Engineering Works, Daya Bagh Road, Neru Agra-282005;
- (ii) Benson Industries, 96, Sri Arabindo Road, Salkia, Howrah;
- (iii) Bata India (P) Ltd., Batanagar, 24, Parganas, West Bengal;
- (iv) A.C. Mittar and Co., Mittar House, 71, anesh Chandra Avenue, Calcutta-13;
- (v) Francis Klien and Co., Ganesh Chandra Avenue, Calcutta-13;
- (vi) Perfect Machine Tools and Co., 6 Sir Phiroz Shah Mehta Road, Bombay-1.

United Kingdom

The British United Shoe Machinery Company Ltd., P.O. Box 88, Belgrave Road, Leicester. LE 4 5BX, England.

West Germany

Constantin Hang Maschinenfabrik, D-7320 Goppingen, Postfach 549.

B3. LEATHER SUITCASES AND TRAVEL GOODS

In the African countries where the finished leather is available, there is good scope for production leather goods for catering to the growing demand. A sizeable quantity of leather goods such as leather suitcases and travel goods is manufactured in the small-scale sector. The frequent trips of the people from town to town or from rural areas to the big cities or a trip abroad require to pack well and to carry comfortably one's personal effects. It is expected that by using simple machinery, the leather goods industry can be started in any part of the African countries, in small towns and rural areas.

This project profile relates to a production capacity of 2000 pieces per month.

(a) Raw material requirements per month

- (i) Printed chrome leather or plain chrome leather;
- (ii) Card board;
- (iii) Cloth lining (drill or silk)
- (iv) Rivets, buckles, pins, nails, packing materials, iron hoops, thread, wax solution, flour dyes, trademark labels etc.

(b) Utilities per month

(c) Other contingencies per month

(d) Fixed capital

- (i) Land and buildings

 - Covered area rented = 150 square metres

- (ii) Machinery and equipment
 - Flat bed industrial sewing machine (power operated)
 - Suitcase stitching machine
 - Upper skiving machine with stand and spares
 - Motor, stand for suitcase stitching machine
 - Spare parts
 - Tools and equipment
 - Workshop and office furniture- (iii) Electrification and installation charges: (10 per cent cost of machines)

TOTAL FIXED COSTS

(e) Process description

The leather suitcases and travel goods are generally made by hand process. Some of the important operations are done by machines in order to increase production and to maintain good quality of products.

The main operations are:

- (i) Layout and cutting of components as per design;
- (ii) Cementing of components with cardboard plywood;
- (iii) Assembling (top cover and bottom);
- (iv) Stitching of components;
- (v) Fitting of handles and locks, rivets, etc.;
- (vi) Lining stitching and fixing
- (vii) Finishing and packing.

(f) Personnel (skills and labour requirements)

Category	Number	Salary rate Per month	Total
Manager	1		
Accountant/cashier	1		
Clerk/storekeeper	1		
Skilled workers	5		
Semi-skilled workers	3		
Unskilled workers	2		
SUB-TOTAL			
Perquisites (20 per cent of salaries)			
TOTAL			

(g) Minimum total capital investment required to establish the units

- (i) Minimum total fixed capital
- (ii) Minimum total working capital
 - Raw materials
 - Utilities
 - Other contingent expenses..
 - Personnel

TOTAL

2. Sources of raw materials

The raw materials are available locally.

3. Sources of machinery and equipment and addresses of suppliers

When ordering, it is advisable to specify whether complete machinery and equipment or only some items of equipment are required.

India

- (i) M/s. Harman Sales Union, 24, Kala Bhavan, Mathew Road, Bombay-4;
- (ii) M/s. Singer Sewing Machine Co. Ltd., Mount Road, Madras-2;
- (iii) Leather and Packaging and Machinery Corporation, 17238, Asaf Ali Road, New Delhi-2;
- (iv) M/s. Indo-German Shoe Machine Co. (P) Ltd., 107, Indl. Estate, Kandivli (West), Bombay-67;
- (v) Bharat Sales Agencies, 14, Maruti Lane, Near Handloom House, Fort, Bombay-1.

Federal Republic of Germany

Muller and KURTH, D-6050 OFFENBACH, AM MAIN 3.

B4. LINING LEATHER

Lining leather is made generally from goat and sheep skin. It is used as a lining material for shoes and leather goods. This project profile relates to a capacity of 5,000 pieces of sheep/goat skin per month.

(a) Raw material requirements per month

- (i) Goat/sheep skin
- (ii) Chemicals

(b) Utilities per month

(c) Other contingencies per month

(d) Fixed capital

(i) Land and buildings

- Land: 1,000 square metres
- Building: 100 square metres (office, working shed, well with tank, cemented pits, etc. 200 square metres)
- 200 square metres

(ii) Machinery and equipment

- Chaving machine, single with starter and motor, 7.5 HP
- Balzing machine and inclined bed, with starter and motor, 2.0 HP
- Ironing machine, with starter and motor, 2.5 HP
- Buffing machine, with starter and motor, 3.0 HP
- Staking machine, with starter and motor, 5.0 HP
- Wooden drums (8" x 6") with starter and motor, 1.5 HP
- Air compressor, with spray equipments, with a starter and motor, 3.0 HP
- Toggle boards
- Measuring machine, hand operated
- Platform weighing machine
- Tools, etc.
- Thickness measuring instruments
- Laboratory glass apparatus, weighing balance
- Electrical accessories and installation
- Cost of office equipment (workshop tables, etc.)

TOTAL FIXED CAPITAL (i) + (ii).

(e) Process description

It is recommended to take the goat/sheep skins having about 5 square feet area, free from major grain and flesh defects. Wet the skins with 0.5 per cent weight of the skins; strip with 0.5 per cent of Borax and wash. Give the Semichrome treatment with 5 per cent chromium crystals, neutralising the tanning bath with 0.5 per cent of sodium bicarbonate (PH of the cut portion 3.8 to 4) and pile the skins. Neutralize (PH of cut portion of skin 5.5), wash the skins and hoist up overnight. Skins are dyed with 0.1 per cent dye, with 0.01 per cent of acetic acid. Skins are liquored with 5 per cent of suitable fat liquor and piled up overnight, dried, saw-dusted, staked, dried, and softened in a drum. The skins are then seasoned with pigment finish; apply two bottom coats with brush and one coat by spray. Then the top coat is applied with two coats with brush and one coat by spray. The leathers are dried, glazed and ironed. In accordance with the requirements of the customers, the skins may also be finished by resin seasons.

(f) Personnel (skills and labour requirements)

Category	Number	Salary rate Per month	Total
Tanner/Manager	1		
Supervisor	1		
Accountant/clerk	1		
Machine operators	5		
Watchmen	2		
Skilled workers	4		
Unskilled workers	6		
SUB-TOTAL			
Perquisites (15 per cent of salaries)			
TOTAL			

(g) Minimum total capital investment required to establish the lining
leather processing unit

- (i) Minimum total fixed capital
- (ii) Minimum total working capital
 - Raw materials
 - Utilities
 - Other contingencies
 - Personnel

TOTAL

2. Sources of raw materials

The raw materials such as raw hides are available locally. As far as the chemicals are concerned, they are available in some African countries on the national market (indigenous or imported). In other African countries, the

governments provide the Lining Leather factories with facilities to import the chemicals directly. In any case, it is recommended to contact the National Chamber of Commerce or Industry.

3. Sources of machinery and equipment and addresses of suppliers

India

- (i) Bengal Tanning Machinery Co., G, New Tangra Road, Calcutta-46;
- (ii) Shalimar Engg. Works Co., 12-8, Prabhuram Sankar Lane, Calcutta-15;
- (iii) Indian Tanning Machinery Co., 17-A Palace Court, 1 Kyd Street, Calcutta-16,
- (iv) Dien Enterprises, C30 Asia Steel Industries, 88/391, Nala Road, Kanpur;
- (v) Pellomac, 216, R.G. Street, Post Box No. 186, Coimbatore-1.

Japan

- (i) Moritani and Co. Ltd., International Trading and Engineering, 4-22 Yaesu 1, Chome, Chuo-ku, Tokyo 103-91;
- (ii) Smolivakogyosha Ltd., 13-6, 5-Chome, Hagashiueno, Daito-ku, Tokyo.

West Germany

- (i) Johs Krause GMBH, Postfach 500968, 2000 Hamburg 50;
- (ii) Johs Krause GMBH Maschinenfabrik, PlanckstaBe 13-15; Postfach 500968, 2000 Hamburg 50;
- (iii) Maschinenfabrik Mceenus-Turner GMBH, P.O. Box 900669, D-6000 FRANKFURT 20.

B5. Vegetable tanned hides and skins (semi-finished leather)

In most African countries, cow hides, goat and sheep skins are tanned and locally utilized or exported to foreign countries. The leather is vegetable tanned in order to obtain semi-finished products. The semi-finished leather can be manufactured for use by leather finished units in African countries. This project profile related to a production capacity of _____ per month.

(a) Raw material requirements per month

- (i) Raw hides
- (ii) Chemicals

(b) Utilities per month

(c) Other contingencies per month

(d) Fixed capital

(i) Land and buildings

- Land 10,000 square metres
- Building 1,100 square metres
(office, working sheds)

(ii) Machinery and equipment

- One paddle 6" x 6" with 10 HP motor
- One drum 8" x 9" with 15 HP motor
- One drum 6" x 6" with 10 HP motor
- One fleshing machine with 7.5 HP motor
- One unhairing machine with 5 HP motor
- One scudding machine with 5 HP motor
- One setting out machine with 5 HP motor
- One boiler
- Other tools and equipments
- Electrical accessories

TOTAL

(e) Process description

A quantity (about 500 pieces) of wet salted cow hides with average weight of 10 kg each is soaked in plain water for a few hours. After proper soaking the material is limed with 1.5 per cent sodium sulphide and 10 per cent lime for 4 to 5 days. After liming the material is unhaired, fleshed and the fleshed weight of hides noted. Then the pelt is delimed with 1 per cent ammonium sulphate and 1 per cent sodium bi-sulphite.

After proper deliming, the pelt is pickled with 3 per cent salt and 1 per cent sulphuric acid, run for 30 to 45 minutes. Then add in the pickle bath pre-tanning syntan and run for one hour. Add 1 per cent starasol KB7C and run for 30 minutes. Add leached myrobalem liquor (PH 5.5) equivalent to 50 per cent powder myrobalem nuts. Run for 2 hours and add 10 to 12 per cent wattle extract. Again run for 2 hours. All water and bleaching syntan run out for 20 minutes.

The tanned leathers are struck out, dipped one by one in 5 per cent solution of epsom salt to fix the tanning and piled overnight. In the following morning the leathers are piled up, set and dried. As far as the bleaching with myrobalem nuts powder is concerned, the powder myrobalem is leached overnight with 3 to 4 times of its weight of warm water containing:

- 4 per cent sodium sulphite
- 4 per cent sodium bi-sulphite
- 2 per cent neutralized naphtalene sulphoric acid santan

The following morning the leach liquor is filtered and used for tanning. The PH of the leach liquor should preferably be 5.0 to 5.5. If desired a three pit rotary leaching system may be adopted. This eliminates possible loss of liquor due to insufficient leaching.

(f) Personnel (skills and labour requirements)

Category	Number	Salary rate Per month	Total
Leather technologist	1		
Mechanic	1		
Supervisors	3		
Accountant	1		
Clerk/typist	1		
Storekeeper	1		
Timekeeper	1		
Watchmen	3		
Skilled workers	10		
Unskilled workers	5		
Casual labourers	10		
SUB-TOTAL			
Perquisites (30 per cent of the salary)			

(g) Minimum total capital investment required to establish the unit

- (i) Minimum total fixed capital
- (ii) Minimum total working capital
 - Raw materials
 - Utilities
 - Other contingent expenses
 - Personnel

Minimum grand total investment requirement

2. Sources of raw materials

The raw materials such as raw hides are available locally. As far as the chemicals are concerned, they are available on the national market (indigenous or imported) in some African countries. In other African countries, the governments provide the tannary factories with facilities to import the chemicals directly. In any case, it is recommended to contact the National Chamber of Commerce or Industry.

3. Sources of machinery and equipment and addresses of suppliers

India

- (i) Abba Wood Crafts, M.C. Road, Madanpur, N. Arcot Dt., (Tamil Nadu);
- (ii) Prakash Engg., M.C. Road, Ambur, N. Arcot Dt., (Tamil Nadu);
- (iii) Pellimac, 216, R.G. Street, P.B. No. 186 Caibatore-1 (Tamil Nadu);
- (iv) Siva Engg. Co., Ambur, N. Arcot Dt. (Tamil Nadu);
- (v) Jagadguru Engg. Co., Ambur, N. Arcot Dt. (Tamil Nadu);
- (vi) M/s. Bengal Machinery Corp. Ltd., 9-A New Tangra Road, Calcutta-46;
- (vii) M/s. Shalimar Engg. Works Pvt. Ltd., 12-B Probhurat, Sakar Lane, Calcutta-15;
- (viii) The India Tanning Machinery Corpor., 36-37 Angappa Naicken St., Madras-1.

Japan

- (i) Moritani and Cie. Ltd., International Trading and Engineering, 4-22 Yaesu 1-Chome Chuo-ku, Tokyo 103-91;
- (ii) "CECOCO", P.O. Box 8, Ibrakin-Fu.

Product Areas C: TEXTILE PRODUCTS

The current structure of the textile production at the small scale level is directed to personal consumption in Africa in cotton and woolen clothes for:

- Man's clothing
- Lace
- Women's and children's clothing
- Raincoats
- Working cloth
- Fiber for nets
- Underwear
- Blankets
- Shirts
- Curtains
- Socks

The main determinant of demand in textile products in Africa is clothing, i.e. basic needs to cover the human body and enhance his personality. The best examples of cloth that is directly clothing are the Indian dhoti and saree, the Ghanaian kente cloths, the Ethiopian shama cloths, the East African khangas and the "Pagne" worn by women in Togo, Benin, Nigeria, Ivory Coast, in Central Africa, etc. There are also the mill-produced blankets, shawls, mufflers, etc. To some extents these serve in the poor countries as clothing and as parts of bedding. They substitute the stitching and making up of garments. In textile production in Africa the important role is given to knitting factories as producers of garments like singlets, vests, varyingly serve as shirts for lower income groups. It is estimated that in the year 2008 the per capita textile consumption in Africa will be 3.2 kg against 2.0 kg in 1980. As mentioned above the main demand determinant will be clothing in terms of the operation of clothing and knitting factories, the immense heterogeneity of clothes and garments gets further multiplied when it is realized that human beings vary in size and shape. Age variations cause further changes, and boys' and girls' wear and infants' wear therefore become distinct product groups. The net result of these fabric variations, form variations, fashion variations and of course, product variations, such as shirts, slacks, trousers, blouses, jackets, etc. is to make most establishments in apparel production rather small, a tendency reinforced by the character of machinery utilized. The tendency for clothing and knitting factories to operate on small or medium scale is in fact universal. The tendency is that even when enterprises become large, they tend to expand more by building separate establishments than by adding to the size of single establishments.

Therefore, the textile production activity at the small-scale level is expected to play a major role, during the implementation of the industrial Development Decade for Africa.

C.1 KNITTED COTTON CLOTH

Knitted cotton cloth is used as raw material for the manufacturing of cotton vests, underwears, outerwears, etc. These items are nowadays an essential requirement of all the African masses. In all African countries, the demand for such items is increasing day by day, which creates a scope for more production of knitted cloth. Since the knitted cotton cloth unit is easily manageable, it can be established in the rural areas.

This project profile relates to a production capacity of 5,000 pieces per month.

- (a) Raw material requirements per month
 - (i) Single cotton yarn;
 - (ii) Packing material, polythelene, strips;
- (b) Utilities per month
- (c) Other contingencies per month
- (d) Fixed capital (US\$)
 - (i) Land and buildings
 - Total area = 100 square meters
 - Covered area = 70 square meters
 - Uncovered area = 30 square meters
 - (ii) Machinery and equipment
 - Five interlock circular knitting machines of 22 guage, diameter 14" to 18";
 - One electric motors and fittings;
 - Office furniture, weighing, balance, racks, etc.;
 - Erections and stores

Total (i) + (ii) =

(e) Process description

The cotton yarn is placed on the circular knitting machines for knitting of cloth. The cloth so knitted in the rolls can already be despatched.

(f) Personnel (skilled and labour requirements)

<u>Category</u>	<u>Number</u>	<u>Salary rate per month</u>	<u>Total</u>
Manager (owner)	1		
Accountant/clerk	1		
Knitting master	1		
Machine operators	2		
Packer and miscellaneous work	1		
Sub-total			
Perquisites (15 per cent of the salaries)			
Total:			

(g) Minimum total capital investment required to establish
the unit

- (i) Minimum total fixed capital
- (ii) Minimum total working capital
 - Raw materials
 - Utilities
 - Other contingencies
 - Personnel

Total (i) + (ii) =

2. Source of Raw Materials

Cotton yarn on cones can be purchased from the spinning mills or yarn suppliers on the national market.

4. Sources of machinery and equipment and addresses of manufacturers
and suppliers

When making enquiries, it is advisable to specify whether complete machinery and equipment or only some items of equipment are required:

India

- (i) Punjab Machinery Works, G.T. Road, Miller ganj,
Lundhiana,

- (ii) S.T.M. Knitting Machinery Manufacturers,
Kalsi Nagar, G.T. Road, Ludhiana,
- (iii) Sohlon Mechanical Works, Industrial Area B,
Ludhiana,
- (iv) Subhash Machinery Industries (P)Ltd., 4, Rasia Lane
Calcutta-12;
- (v) Ray Mechanical Industries, Gannondankerley & Co. Ltd.,
P.O. Box 1547, Bombay.

Japan

- (i) Moritani and Co. Ltd., International Trade and Engineering,
4-22, Yaesu 1-Chome, Chuo-ku, Tokyo;
- (ii) Kondo Sewing Machine Co. Ltd., 163 Umegae-cho Kita-ku
Osaka.

Federal Republic of Germany

- (i) Liba-Maschinenbau GmbH, 0.8674, P.O. Box 1120,
Naila/Bayern,
- (ii) Jurgens Maschinenbau GmbH C. KG, P.O. Box 1454,
D-4407 Emsdetten;
- (iii) Hergeth Hollingsworth GmbH, D-4408, Dulmen.

C2: READY MADE GARMENTS

Garments are a basic need for every human being. Therefore, the readymade garments, as the name itself implies, are garments ready for wearing. In Africa, the ready to wear garments have been finding more and more acceptance in indigenous markets.

The manufactures of readymade garments may be undertaken at low cost, besides achieving economy in cloth consumption and mass production. The readymade manufacture unit proposed here deal with the manufacture of cotton shirts, pyjamas, petticoats and blouses, for a production capacity of 18,000 = cotton shirts, 18,000 pyjamas and 18,000 blouses per annum.

(a) Raw material requirements per month

- (i) Cotton popline, crepe fabric for shirts;
- (ii) Cotton long cloth (for pyjama/petticoats);
- (iii) Cotton fabric for blouses;
- (iv) Sewing thread, buttons, hooks, collars,
packing materials, boxes, etc.

- (b) Utilities per month
- (c) Other contingencies per month
- (d) Fixed capital

(i) Land and buildings:

- Total area = 100 sq. metres
- Covered are (three rooms) = 80 sq. meters
- Uncovered area = 20 sq. metres

(ii) Machinery and equipment

- Twenty foot operated sewing machines
- Two overlock machines threads with motors;
- Two electric irons;
- Pressing tables, cutting tables, stools, office furniture, racks tools, etc.

(e) Process description

A garment industry can successfully function when it is run through an organized division of labour. Each component of the garment must be done by one person who will be specializing in that specific component. This will contribute to the efficiency of production and quality of the garment.

Cutting of the fabric into the most economic design so that wastage is minimized is a very important technique in the production of garments.

The fabric in different colours/designs is spread on a table and is cut with hand scissors as per required design size and shape of the garment. The cut pieces are stitched by lock stitch sewing machines. Button hoking, button stitching, hooks attaching etc. is done as usual. The garments are then pressed and packed in cartons.

(f) Personnel (skills and labour requirements)

<u>Category</u>	<u>Number</u>	<u>Salary rate per month</u>	<u>Total</u>
Manager (owner)	1		
Accountant (cashier)	1		
Cutter master	1		
Tailors	20		
Overlock machine operators	2		
Pressmen	2		
Packer/mix-work	1		

Sub-total

Perquisites (15 per cents
of the salaries)

Total:

(g) Minimum total capital investment required
to establish the unit

(i) Minimum total fixed capital.....

(ii) Minimum total working capital

- Raw materials
- Utilities
- Other contingent
expenses
- Personnel

Sources of raw materials

The fabrics in different colours or design can be purchased locally from the suppliers on the national markets.

Sources of machinery and equipment and address of suppliers

When making enquiries, it is advisable to specify whether complete machinery and equipment or only some items of equipment are required.

India

- (i) M/s Singer Sewing Machine Co. Netaji Subbas Marg,
Daryaganj, Delhi;
- (ii) M/s Paul Brothers and Co., 1525, Nai Sarak, Delhi;
- (iii) M/S See delaers of Singer an Usha Sewing Machines;
- (iv) M/s British Machnery Suppliers, Nai Sarak, Delhi.

Japan

Moritani and Co. Ltd., International Trade and Engineering, 4-22 Yaesu
1.Chome, Chuo-ku, Tokyo.

D. PAPER AND PAPER PRODUCTS

D.1 Hand-made paper

Paper is a very highly consumed product. Its production started on cottage industry level two hundred years back. Therefore its production on small-scale industry level is very conceivable.

Hand-made paper functionally suitable for writing and printing for local use can be produced from agricultural wastes derived from rice stalk, spent sugarcane stalk, (bagasse), sisal, some types of long grasses etc., and also from waste paper and waste cloth (rags) semi-mechanically without any elaborate modern machinery. Compared with machine-made paper which is based on high grade wood and chemical pulp, hand-made paper has less strength and lacks smoothness of finish but can be used satisfactorily for ordinary local purposes. The production of hand-made paper can be conveniently undertaken as a local small-scale enterprise.

This project profile relates to a production capacity to 10 tonnes per month.

(a) Raw material requirements per month

(i) Basic materials

- Sisal fibre wastes
- Bagasse waste
- Long grasses
- Rice stalk
- Waste paper
- Rags and waste cloth cuttings

(All these materials can be used together or separately, according to local convenience).

(ii) Chemicals

- Caustic soda
- Bleaching powder
- Whitening agent

(b) Utilities per month

(c) Contingencies

(d) Fixed capital

(i) Land and building

- Land = 150 sq. metres
- Building = 100 sq. metres

(ii) Machinery and equipment

- Shredder
- Weighing machine
- Beating and pulping machine

- shredder
- weighing machine
- Beating and pulping machine
- Digester
- Washing vats
- Hydraulic press
- Dryer
- Calendering machine
- Cutting and sizing machine
- Assorted tools and moulds
- Office equipment and furniture

(e) Process description

Waste paper is a good source of raw material for paper making because paper is almost hundred per cent cellulose. We may also use cotton rag wastes. Extraction of pulp from pulp tree requires extensive chemicals and capital layout.

The basic raw materials are shredded and cut into small pieces and the mixture is treated with water, caustic soda and bleaching agents and mashed into fine pulp in a digester. The pulp is then purified by thorough rinsing in fresh water. The excess water is expelled under pressure from the pulp. The semi-stiff material is pressed in a calendering machine into sheets and thereafter the sheets are cut to size for sale.

(f) Personnel (skills and labour requirement)

Function	Number	Salary rate per month	Total
Manager (cum chemist)	1		
Accountant (cum storekeeper)	1		
Purchase/sales assistant	1		
Office secretary/typist	1		
Skilled workers	6		
Semi-skilled workers	6		
Unskilled workers	6		

Sub-Total :

Perquisites, 15 per cent of salary and wages

Total :

(g) Minimum total investment required to establish the unit

(i) Minimum total fixed capital

- land and building
- machinery and equipment

Total :

(ii) Minimum total working capital

- Raw materials
- Utilities
- Personnel
- Contingencies

Total

2. Sources of raw materials

The basic agricultural raw materials (sisal, baggase , rice stalk, and long grasses) may be obtained from rural communities and farms. Waste cloth cuttings and rags may be obtained from tailoring establishments. Waste paper may be available from government offices, printing press, courts, commercial establishments and private hawkers.

Chemicals have to be procured from trade channels or government corporations which deal with import of materials. The Ministry of Industry and the Chamber of Commerce and Industry in respective countries may be able to assist with information on producers and distributors of the chemicals or other sources of supply.

3. Sources of machinery and equipment and addresses of suppliers

While contacting the sources indicated below, it should be specified that the paper-making machinery is required for producing hand-made paper from wastes.

The beater can be locally made. The drier oven can also be made locally. Estimate of locally made machinery for paper production is as follows.

Beater
Press
Drier room with shelves
Total

Source of machinery

Canada

- (i) Albany Engineering Systems, Canada Ltd., PPha Division, Point Claire, Quebec
- (ii) Beloit Canada Ltee Ltd., Point Claire, Quebec.
- (iii) Bird Machine Company of Canada Ltd., Saskatoon
- (iv) Canron Limited, Mechanical Division, Rexdale, Ontario.
- (v) Dominion Engineering Works Ltd., Montreal, Quebec.
- (vi) Contact other sources through: Canadian Manufacturers Association, 1 Yonge Street, Toronto

France

- (i) Lamort (F) M), S.S. et U, B.P. 46, 51302 Vitry, Le Francis
- (ii) Michon S.A., Tour Franklin, Cedex No.11, 92081 Paris La Defense
- (iii) SIGEE, 171, av. du Gal-de-Gaulle, 92200, Neuilly-sur-Seine.

German Democratic Republic

Industriean Lagen - Import, DDR-1080 Berlin, Bauerstrasse 83-84

Hungary

Techno impex, Budapest V, Dorottya U.6

India

- (i) National Small Industries Corporation, Near Okhla Industrial Estate, New Delhi 110020
- (ii) Contact: Khadi & Village, Industries Commission (Hand-made Paper Division), Vile Parle, Bombay
- (iii) Contact: Federation of Indian Export Organization Allahabad Bank Building, 17, Parliament Street New Delhi 110001.
- (iv) Bertram Scott India Ltd., 1/1 Kimber Street, Calcutta-17
- (v) Bird and Co. Ltd., Process Engineering Division, Dakhindari, Calcutta 48

West Germany

- (i) Gebr. Bellmer KG Maschinenfabrik, 7532 Niefern-Oschelbronn Postfach 6,
- (ii) Hondux-Wrk, Herbert A. Merges KG Abt 33, D-6450 Hanau 11/Industriegebiet, Wolfgang, Postfach 1-10-09-10
- (iii) P.J. Wolf & Sohne GmbH, Maschinen und Apparatebau 5160 Duren, Postfach 125
- (iv) Jagenberg AG Postfach 1123, D-4000 Dusseldorf

England

- (i) TVW Paper Machine Group Ltd. 18th Floor, Pembroke House, 44 Wellesley Road, Croydon, Surrey

Finland

- (i) Tampella Ltd. P.O. Box 267, 33101 Tampere, Finland

Norway

Rauma - Repola Dy
Pori Works, P.O. Box 109
N. 3501 Honefoss, Norway
Sodra Skogsagarna AB
S-351 89 Xaxjo, Sweden

Japan

Contact: Japan Consulting Institute 1-1, Yuraku-Cho, Chiyoda-ku, Tokyo

Korea

Contact: Korea Society for the Advancement of Machine Industry (KOSAMI), 1-643, Yeouido-Dong Yeongdeungpo-Gu, Seoul

Sweden

- (i) AB Klippans Finpappersbruk, Klippan
- (ii) Nils Troedsson Paper Co., AB, Goteborg.
- (iii) Contact: The Swedish Export Council, P.O. Box 5513 S-114 85 Stockholm

Switzerland

- (i) ESCHER WYSS Aktiengesellschaft, Escher Wyss-Platz, CH-8023, Zurich
- (ii) Bachofen Meier AG, Feldstrasse 60, CH-8180 Buelach
- (iii) Polytype AG, Route de la Glane, 26, CH-1702 FRIBOURG
- (iv) Bell Maschinenfabrik AG, CH-6010 Kriens
- (v) Leder Co., AG, Fluhstrasse 30, CH-8640, RAPPERSWIL

D.2. PAPER BOARD CARTONS

Paper board cartons are effective medium for packaging small items such as automobile parts, pharmaceutical products, plastic products, rubber components, glass items, etc. During this industrialization period in Africa, the demand for paper board cartons is increasing day-by-day especially in the large cities and towns. It has the advantages of light weight, easy fabrication, easy for storing, and it keeps the articles dust free after sealing and has the added advantage of attractive printing, thus making the packed item more eye appealing for sales purposes.

Inputs to manufacturing unit ((capacity 300 tons annually)(a) Raw material requirements, intermediate and accessories per month

- (i) Boards
- (ii) Papers
- (iii) Inks
- (iv) Glue, etc.

(b) Utilities per month(c) Contingencies per month(d) Fixed capital

- (i) Land and buildings
 - Buildings (areas for office, stores, etc.: 50 square metres, working shed 150 sq. metres)

(ii) Machinery and equipment

- Automation stop, cylinder letterpress machine, size 18" x 23"
- Printing machine - 10" x 15"
- Cutting and creasing machine, 20" x 26"
- Paper cutting machine, 42"
- Dab press, proof press, types, etc.
- Testing equipment (physical balance, metre scale etc.)
- Dies, moulds, etc.
- Office equipments, working tables, etc.

(iii) Electrification and installation charges
(10 per cent of the costs of the machinery and equipment)

Minimum total cost of machinery and equipment = (ii) + (iii) =

Minimum total fixed capital = (i) + (ii) + (iii) =

(e) Process description

Paper board is first printed on the printing machine as per requirements. Then, they are punched to the required size on the cutting and creasing machine, then creased, folded, glued if required to give its final shape.

(f) Personnel (skills and labour requirements)

Function	Number	Salary rate per month	Total
Manager (owner)	1		
Salesman/accountant	1		
Mechanic	1		
Clerk/typist	1		
Skilled workers	4		
Unskilled workers	4		
Sub-Total:			
Perquisites, 15 per cent of the salaries			
Total:			

(g) Minimum total capital investment required to establish the unit

- (i) Minimum total fixed capital
- (ii) Minimum total working capital
 - Raw materials
 - Utilities
 - Other contingent expenses
 - Personnel

Minimum grand total capital investment requirement
(i) + (ii) =

2. Sources of machinery and equipment and addresses of suppliers

India

- (i) M/S Printers House (P) Ltd., 10, Scindia House, Con. Place, New Delhi-110001
- (ii) M/S Indo-Europe Trading Co. Pvt. Ltd., Bhupen Chambers, 9, Dalal Street, fort, Bombay-400023
- (iii) M/S Manubhai Sons & Co. Mamu Mansions, 16, Shaid Bhagat subash Marg, Delhi-110006
- (iv) M/S J. Mahabeer & Co.

Japan

- (i) Moritani and co. Ltd., International Trading and Engineering, 4-22 Yaesu, 1-Chome, Chuoku, Tokyo 103-91
- (ii) CECOCO, P.O. Box 8, Ibaraki-Fu.

Switzerland

- (i) Bachofen & Meier AG, Feldstrasse 60, CH-8180 BUELACH
- (ii) ESCHER WYSS, Aktiengesellschaft, Escher-Wyss-Platz, CH-8023 ZURICH
- (iii) Polytype AG, Route de la Glane 26, CH-1702 FRIBOURG
- (iv) Bell maschinenfabrik AG, CH-6010 KRIENS
- (v) Leder & Co. AG, Flusstrasse, 30 CH-8640 RAPPERSWIL.

D.3. PAPER ENVELOPES

The demand for office stationery and allied items is fast increasing in Africa. But the scarcity of these items is due to the lack of foreign exchange required to import them. In fact, paper envelopes play important part as a stationery materials in any type of correspondence. Paper envelopes are ideal medium of correspondence between two establishments, between members of the family and between friends. Therefore, there is a tremendous scope of market for setting up manufacturing units for a range of paper envelopes and other stationery articles in the African cities as well as in the rural areas.

1. Inputs to manufacturing units (Capacity = one million pieces a year)

(a) Raw material requirements, intermediates and accessories per month

- (i) Paper
- (ii) Gum, labels, etc.
- (iii) Packing boxes (card board)

(b) Utilities per month

(c) Contingencies per month

(d) Fixed capital

(i) Land and buildings
Buildings (areas for office, stores,
50 square metres - working shed, 50 square metres)

(ii) Machinery and equipment

- Paper cutting machine
- Envelope making machine
- Testing equipment (physical balance, metre scales etc.)
- Moulds/dies, etc.
- Office equipment, working tables, etc.

(iii) Electrification and installation charges

(10 per cent of the cost of machinery and equipment)

Minimum total cost of machinery and equipment

(ii) + (iii) =

Minimum total fixed capital :

(i) + (ii) + (iii) =

(e) Process description

The paper is cut to the required size of the envelope. Then, it is ed in blocks of 150-200 sheets, depending upon the thickness of paper, in the envelope making machine wherein these are cut into the shape of envelope. They are then folded, glued to required shape of the envelope.

(f) Personnel (skills and labour requirements)

Function	Number	Salary rate per month	Total
Manager	1		
Salesman/accountant	1		
Mechanic	1		
Clerk/typist	1		
Delivery man	1		
Skilled workers	3		
Unskilled workers	5		

Sub-Total:
Perquisites, 15 per
cent of salaries

Total:

(g) Minimum total capital investment required to establish the unit

- (i) Minimum total fixed capital
- (ii) Minimum total working capital
 - Raw materials
 - Utilities
 - Other contingent expenses
 - Personnel

Minimum grand total capital
investment requirement =

2. Sources of raw materials

The raw materials are available on the national markets (indigenous or imported) in each African country.

3. Sources of machinery and equipment and addresses of suppliers

India

- (i) M/S Indo Europe Trading C., 1396 Chandni Chowk,
Delhi-11006 and their office at Bombay,
Calcutta and Madras;
- (ii) M/S Printers House Pvt. Ltd., 10 Scindia House,
Con. Place, New Delhi-11001
- (iii) M/S Industrial Paper Machines (P) Ltd.
 - 1. A-32 Industrial Area, Phase I, New Delhi
 - 2. Sonawala Industrial Estate, Andheri East, Bombay
- (iv) M/S Gunvarity & Co., Ground Floor, 41, Tamarind
Lane, Fort, Bombay-400001.
- (v) M/S Anna Engineering Works, Guijon Kerala

- (vi) M/S Associated Packaging Machinery Co., B, Lyons Range, Calcutta, Calcutta-700001
- (vii) M/S Bhawani Industries, 2, 1st Cross, K.V. Temple Street, Bangalore-53

Japan

- (i) Moritani and Co. Ltd., International Trading and Engineering, 4-22 Yaesu 1; Chome, Chuo-ku Tokyo 103-91
- (ii) CECOCO, P.O. Box 8, Ibaraki, Osaka-Fu

D.4. PAPER NAPKINS AND TOILET PAPER ROLLS AND FACIAL TISSUES

The popular manifold use of paper napkins requires the intensive development of the manufacture of paper napkins, toilet paper rolls and facial tissues at small-scale level in African countries. These papers are absorbent, hygienic, light and can be produced with attractive printing. As far as toilet papers are concerned, there is a wide consumption for sanitation not only in the rural areas, but specially in large African cities for the hotels, restaurants, cinema houses, etc.

The African policies on the popularization of tourism require not only increase in the number of hotels, holiday homes, etc., but should also emphasize an increase in the production of paper products such as paper napkins, toilet paper rolls and facial tissues at small-scale level.

This project profile relates to a production capacity of 300 metric tons per annum.

(a) Raw material requirements per month

- (i) Tissue paper (all grades)
- (ii) Paper cartons, cores
- (iii) Inks, thinners, etc.
- (iv) Polythelene film
- (v) Other packing materials

(b) Utilities per month

(c) Other contingencies per month

(d) Fixed capital

(i) Land and buildings

- Land: 400-square metres
- Buildings: areas for office, stores, etc
= 50 square metres; working shed = 200 square metres

(ii) Machinery and equipment

- Two colour flexographic printing machine for paper napkins
- One toilet paper roll making machine, 9 stations with arrangements for rewinding, perforating and cutting arrangements
- One physical balance (testing equipment)
- One metre scale (testing equipment)
- Cutting printing dies
- Office equipment, furniture

(iii) Installation and electrification charges

Minimum total cost of machinery and equipment = (ii) + (iii)

Minimum total fixed capital (i) + (ii) + (iii)

(e) Process description

Tissue paper rolls are fed to the flexographic printing machine for paper napkins wherein these are printed and cut to the required sizes with the device already fixed onto the machine. Similarly toilet paper rolls are slitted on roll making machine rewinded on the paper or wooden core to the required sizes. These are then packed in number or as required.

(f) Personnel (skills and labour requirements)

Category	Number	Salary rate per month	Total
Manager (owner)	1		
Accountant	1		
Mechanic	1		
Salesman	1		
Delivery man	1		
Skilled workers	3		
Unskilled workers	3		

Sub-Total

Perquisites, 15 per cent of salaries

TOTAL:

(g) Minimum total capital investment required to establish a manufacturing unit for paper napkins, toilet paper rolls and facial tissues

(i) Minimum total fixed capital

(ii) Minimum total working capital

- Raw materials

- Utilities

- Other contingent expenses

- Personnel

Minimum grand total capital investment requirement :

2. Sources of raw materials

The raw materials are often available locally on the national markets (indigenous or imported).

3. Sources of machinery and equipment and addresses of suppliers

India

- (i) M/S Industrial Paper Machines (P) Ltd., A-32
Naraina Industrial Area, Phase I, New Delhi,
or Sonawala Industrial Estate, Ardheri East, Bombay

- (ii) M/S Indo-European Trading Co., 1396, Chandni Chowk, Delhi-110006
- (iii) M/S Akeme Paper Machines, D-23 N.D.S.E. Part I, New Delhi
- (iv) M/S Associated Packaging Machinery Co., 8, Lyons Range, Calcutta-700001
- (v) M/S Bhavani Industries, 2, 1st Cross, K.V. Temple Street, Bangalore-53

Japan

Moritani and Co. Ltd., International Trading and Engineering, 44-22 Yaesu 1-Chome, Chuo-ku, Tokyo 103-91

Switzerland

- (i) Bachofen & Meier AG, Feldstrasse, 60, CH-8180 Buelach
- (ii) Edscher Wyss, Aktiengesellschaft, Escher-Wyss-Platz, CH-8023, ZURICH
- (iii) Polytype AG, Route de la Glane, 26, CH-1702 Fribourg
- (iv) Bell Maschinenfabrik AG, CH-6010 KRIENS
- (v) Leder & Co., AG, Fluhstrasse, 30, 8640 RAPPERSWIL.

E. WOOD AND WOOD PRODUCTS

Wood is commonly used in African countries as building material and for the manufacture of furniture and fixtures. Therefore the development of a small saw milling operation becomes an excellent way for the immediate supply of sawn wood or simply graded boards for furniture or other uses, in order to satisfy the high consumption of wood in Africa.

While more integrated wood-using industries require skilled labour and significant capital small saw milling units as suppliers of woods can be used as a way of leading to larger steps because of the following:

- the comparatively low investment cost per unit of production;
- the simplicity of operation and the ability to start in a fairly labour-intensive way;
- the feasibility of production volume and of replacement of labour with capital at later date.

Since many woods, in their original shape, are not adequate for immediate use, there are improved woods consisting of:

- Veneer
- Plywood

According to the extensive market development of wood products and in terms of local supply, import substitution, multiplier effect on rural employment, and possible earnings, the sawn wood production and improved woods (plywood panel) are more significant.

Sawn wood and plywood panel are used as raw material, for manufacturing the following wood products at the small-scale level:

1. Furniture and fixtures;
2. Wooden crates;
3. Tea chest plywood;
4. Wooden sewing machine covers;
5. Wooden plugs;
6. Wooden storage cupboards;
7. Wooden storage shelves and racks;
8. Wooden wool slabs;
9. Articles made from veneers, such as ice-cream, spoons, toothpicks and paint-stippers,

10. Flush doors;
11. Footwear;
12. Mosaic parquetry, etc.
13. Pencils.

E.1 PENCILS

1. Pencils, specially black lead pencils, are one of the essential items of office stationery and are part of the educational kit in daily use by students. The production of pencils is so important that in some African countries the Ministry of Education takes over the responsibility of its production.

This project profile relates to a production capacity of 2500 gross pencils per month (roughly 100 gross per day). Bulk of the production would be the black lead variety but in the same plant and with a slight change in some of the raw materials, other varieties of pencils like copying and coloured can be produced. Production technology is simple. Pencil industry can also be set up as a women's enterprise.

Good quality graphite and right type of wood (softwood) are the critical raw materials for pencil manufacture from the basic stage namely the production of lead slips and the preparation of wood slat which is to house the slip. Alternately, pencil production may be undertaken from the intermediate stage namely from purchased slips and wood slats in which case, the investment can be extremely low. It is however not difficult to set up the industry from the basic stage. This profile is based on the basic stage.

(a) Raw material requirements

- Sawn wood sleepers (cut to size)
- Graphite lumps
- Plastic ball clay
- Wood glue
- Sand paper
- Lacquer (in different colours)
- Stamping foil
- Metal ferrules and rubber tips (optional)
- Packing materials
- Fuel (firewood)

- (b) Utilities (per month)
- (c) Contingencies (per month)
- (d) Fixed capital

- (i) Land and building

- Land 500 square metres
 - Building 350 square metres

- (ii) Machinery and equipment

- Wood slat cutter
 - Slat grooving machine
 - Pug mill
 - Slip extrusion machine (Low temperature)
 - Baking furnace (brickwork construction based on wood fuel; maximum temperature 60-80 degree C)
 - Baking moulds (brass)
 - Press (for compacting the glued slats)
 - Finished slat cutter
 - Lacquer coating machine
 - Stamping machine
 - Ferrule and rubber tip fitting machine
 - Electrical motors and accessories
 - Office furniture and equipment

- (e) Process description

Pencil making consists of three stages (preparation of wood slate into sheaths for housing the lead slip, preparation of the lead slip, and the finishing of the pencil including lacquering, stamping and fitting of ferrule and rubber tip). The first stage can be avoided if a suitable arrangement is made with a timber joinery mill for commercial supply of ready made slats in 6 or 8 ply.

The entire three-stage process is as follows:

Soft wood sleepers dressed and cut to size are obtained from the joinery mill and sawn into slats (185mm x 55m x 5.5 mm) and grooves are cut into the slat to obtain a 6-ply or 8-ply design. The grooves are intended to house the pencil lead and hence must correspond to its dimensions. Each slat represents the half portion of the pencil in 6 or 8 ply. The slates are sand-papered and smoothed.

Next the lead slip is prepared by mixing fine graphite powder, clay and gum fragacanth into thick paste and extruded into a uniform tube of lead. The lead slip, cut to pencil size, is hardened for easy handling by baking it into a low temperature furnace. The next operation consists of placing the lead slips into the open grooves of the slats, gluing together two slats firmly and compacting them into one piece of slat and then cutting them along the plys into 6 or 8 pencils. These are then dressed to smoothness, cleaned, lacquered, stamped, fitted with rubber and ferrules where necessary, packed and marketed.

(f) Personnel (skills and labour requirements)

Function	Number	Salary rate Per month	Total
Manager cum chemist	1		
Purchase/sales assistant	1		
Accountant/storekeeper	1		
Office Secretary/typist	1		
Skilled workers	3		
Semi-skilled workers	6		
Unskilled workers	12		
SUB-TOTAL			
Perquisites, 15 per cent of salaries			
TOTAL			

(g) Minimum total investment required to establish the unit (US\$)

(i) Minimum total fixed capital:

- Land and building
- Machinery and equipment

TOTAL

(ii) Minimum total working capital:

- Raw materials
- Utilities
- Personnel
- Contingencies

TOTAL

GRAND TOTAL

2. Source of raw materials

Various species of soft wood for example, cedar, cypress, cedrella, Diambi, Agba (Tola) and olon (Fagura) are available in many African countries in the Eastern, Central and Western African subregions. The above listing of the suitable species is not exhaustive and technical advice on suitable woods may be sought from the following organizations, among others:

- (i) Forest Products Research Institute (Kumasi Ghana);
- (ii) Timber Research and Development Association, High Wycombe (UK)
- (iii) Centre Technique Forestiere Tropical, 45 avenue de la Belle Gabrielle Nogent sur Marne (France)
- (iv) Forest Research Institute Dehradun, India;
- (v) Forest Industries Advisory Group, Economic Commission for Africa, P. O. Box 3001, Addis Ababa, Ethiopia.

Deposits of good quality graphite exist in Madagascar, and Zimbabwe. Other well - known suppliers are India and Sri Lanka. Information on the availability of graphite in other African countries may be sought from the Department of Mines and Geology in respective countries.

Good quality plastic clays (other than Kaolin) are available in Algeria, Egypt, Morocco, Mozambique, Swaziland, United Republic of Tanzania and Zimbabwe.

Metal ferrules and rubber tips may be made locally from steel strips and rubber blocks respectively or purchased from commercial sources.

3. Sources of machinery and equipment and addresses of suppliers

Czechoslovakia

Techno Export
Prague

Federal Republic of Germany

- (i) Ultramar Fiscer and Co., Dusseldorf;
- (ii) Becker and Van Hullen, Krefeld;
- (iii) Siempelkamp Ltd., Krefeld
- (iv) Friedrich Ehrhardt, Bleistiftmaschinenfabrik GMBH, Spenglerstrasse,
8500 Noraberg;
- (v) Bleistiftmaschinenfabrik, 8500 Hurnberg, Hans Buntestrassen-11.

India

- (i) Standard Pencil Factory, Industrial Estate, Guindy, Madras
- (ii) United Engineering Co., Cheruvannur, Feroke, Kerala;
- (iii) Oriental Machinery Supplying Agency, 12 Mission Row Calcutta-1;
- (iv) Batlibor and Company, 26, Rajendra Mukherjee Road, Calcutta-1.

Netherlands

Van Reitcheten and Houwens Rotterdam 6.

Switzerland

Fahrni Industries Ltd., Zurich 2.

Yugoslavia

Iva Lola Ribar
Zelnsnik, Belgrade

E2. WOODEN CRATES

With the implementation of the industrialization policy in Africa, it is anticipated that the production of consumer and engineering goods will increase. Accordingly the demand for wooden crates will increase. In fact, the wooden crates are and will be required for transportation of bulk stores by industry and business houses

1. Inputs to manufacturing unit

(a) Raw material requirements, intermediates and accessories per month

- Planks or similar packing wood
- Nail

(b) Utilities per month(US\$)

(c) Other contingencies per month

(d) Fixed capital

(i) Land and buildings (rented)

- Land:150 square metres
- Buildings:200 square metres

(ii) Machinery and equipment

- vertical band saws, with 5 HP motor
- circular saws, with 3 HP motor and cross cutting bench
- hot brazing equipment
- furniture and equipment

(iii) Installation and electriciation charges

(10 per cent of the cost of machinery and equipment)

Minimum cost of machinery and equipment (ii) + (iii)

Minimum total fixed capital:

(i) + (ii) + (iii) =

(e) Process description

Planks, size beam and battons are cut to size in the cross cutting machine. The top and bottom of crates, size and ends are separately built up according to sizes of crates. During assembly for reinforcement purpose, wooden square bars may have to be fixed at the four corners of the crate with supporting cross bars may have to be fixed at the four corners of the crate with supporting cross bars. Care should be taken to see that no defective planks are used.

(f) Personnel (skills and labour requirements)

Function	Number	Salary rate Per month	Total
Manager	1		
Lawyer	1		
Clerk/accountant	1		
Skilled workers	2		
Helpers	2		
Watchman	1		
SUB-TOTAL			
Perquisites, 10 per cent of salaries			
TOTAL			

(g) Minimum total capital investment required to establish the unit

- (i) Minimum total fixed capital
- (ii) Minimum total working capital
 - Raw materials
 - Utilities
 - Other contingent expenses
 - Personnel

Minimum grand total capital investment requirement

2. Sources of raw materials

The raw materials are available locally. Planks of required sizes are procured from local market depending on demand.

3. Sources of machinery and equipment and addresses of suppliers

When making inquiries, and in order to satisfy your requirements please indicate if you would like to receive complete machinery and equipment or only some parts.

India

- (i) M/s. Atlas Engineering Industries, G.T. Road, Batala, Punjab;
- (ii) M/s. Varat Machinery, 678, Netaji Subhas Road, Calcutta-1;

West Germany

Maschinenfabrik Rovert burkle GMBH and Co., P.O. Box 160, D-7290,
FREUDENSTADT

Switzerland

- (i) Uischer and Bolli AG. Zurichstrasse, 127, CH-8600, DUBENDORF;
- (ii) Wahli Freres S.A. Fabrique de Machines, CH-2735, BEVILARD;
- (iii) INYECTA AG, CH-5723, TEUFENTHAL;
- (iv) Fischer Georg Burgg Oehler AG, Wildischachen, CH-5200, BRUGG;
- (v) IRION, W. and P., Rauracherstrasse, 3 CH-4125, RIEHEN;
- (vi) KUPFERL & P., Thurstrasse 57, CH-3612, STEFISBURG;
- (vii) Reinhard AG. H. Maschinenfabrik, CH-4950 HUTIWIL;
- (viii) Schneider Hugo Maschinenbau, CH-5416, KIRCHADOLF;
- (ix) HITLI Aktoiengesellschaft, FL-9494, SCHAAN;
- (x) Oertli Werkzeuge AG Hochfederstrasse, 11, CH-8180 BULACH

E3. WOODEN DOOR FRAMES AND SHUTTERS

There is an important requirement of wooden door frames and shutters in every household construction and in any institution buildings. Usually, whenever a house is constructed carpenters have to be engaged for the manufacture of doors, windows, shutters, etc. following the development of the household construction in Africa, it is recommended to increase the manufacture of wooden doors and windows, specially at the small-scale level.

1. Inputs to manufacturing unit(a) Raw material requirements, intermediates and accessories per month

- (i) Wood;
- (ii) Plywood of various kinds;
- (iii) Hinges and other fittings, etc.,
- (iv) Polish and paint materials.

(b) Utilities per month(c) Contingencies per month(d) Fixed capital

(i) Land and buildings

- Land: 400 square metres
- Buildings (covered shed: 200 square metres);

(ii) Machinery and equipment

- Band saw macking 36" with motor 10 HP
- Circular saw 12" with 2 HP motor
- Surface-cum-thickness planner machine with motor, 2 HP
- Jointer planner 12" with motor, 2 HP
- Moulding spandle machine 20" x 24" size
- Tenoning machine with motor, 5 HP
- Belt sander machine with motor, 3 HP
- Mortising chair chisel machine with motor and 1/4" to 1" size chain and motor, 1 HP

- Saw sharpening machine with motor, 1 HP
- Saw brazing machine (electrically operated)
- Double ended grinder machine with 3/3" HP motor;
- Portable drill 12" capacity with stand
- Knife sharpening machine with 1/2 HP motor
- Hand tools - 20 sets
- Work tables - 10
- Office equipments

(iii) Electric installation charges

(10 per cent of the costs of machinery and equipment)

Minimum total cost of machinery and equipment (ii) + (iii) =
 Minimum total fixed capital (i) + (ii) + (iii) =

(e) Process description

Suitable sizes of planks are cut on the bend saw machine. These are cut to required sizes on hand saw and circular saw depending upon the size. They are then surface planned to required thickness on the planner. The edge forming, drilling holes and moulding operations are done on the respective machines. The different items are then glued and assembled.

(f) Personnel (skills and labour requirements)

Function	Number	Salary rate Per month	Total
Manager (owner)	1		
Machine operators	4		
Clerk/accountant	1		
Skilled workers	4		
Semi-skilled workers	3		
Labourers	3		
Watchmen	2		
Helpers	3		
SUB-TOTAL			
Perquisites, 15 per cent of the salaries			
TOTAL			

(g) Minimum total capital investment required to establish the unit

- (i) Minimum total fixed capital
- (ii) Minimum total working capital
 - Raw materials
 - Utilities
 - Other contingent expenses
 - Personnel

Minimum grand total capital investment requirements =

2. Sources of raw materials

The log timber as a basic raw material is available locally

3. Sources of machinery and equipment and addresses of suppliers

India

- (i) M/s. Sugga Engineering Works (P) Ltd. 8/39, South Industrial Area, Kirti Nagar, New Delhi-15;
- (ii) M/s. Soneic Machine Tools, 10, Industrial Estate, Rajkot (Gujarat);
- (iii) M/s. The Bharat Mechanical Works (Road), GT. Road, Batala;
- (iv) M/s. Ramanuja Industries, Kanimangalam, Trichur.

West Germany

Maschinenfabrik Robert, Burkle GMBH and Co. P.O. Box 160, D-7290 Freudenstadt.

Switzerland

- (i) Uischer and Bolli AG, Zurichstrasse, 127, CH-8600 DUBENDORF;
- (ii) Wahli Freres, S.A. Fabrique de Machines, CH-2735 BEVILARD;
- (iii) INYECTA AG, CH-5723 TEUFENTHAL;
- (iv) Fischer Georg, Brugg Oehler AG, Wildischachen, CH-5200 BRUGG;
- (v) IRION;W and P, Rauracherstrasse, 3, CH-4125 RIHEN;
- (vi) KUPFERL & P., Thurstrasse 57, CH-3612, STEFIISBURG;
- (vii) REINHARD AG. H. Maschinenfabrik, CH-4950 HUTWILL;
- (viii) Schneider Hugo Maschinenbau, CH-5416 KIRCHDORF;
- (ix) HILTI Aktiengesellschaft, FL-9494 SCHAAN;
- (x) Dertli Werkzeuge AG, Hohefelderstrasse, 11, CH-8180 BULACH.

E4. WOODEN FURNITURE

Furniture and fixtures are essential for each house and office. Modern life requires furniture and fixtures starting from plank, table, chair, rack, meatsafe, bed, etc. Furniture made out of good quality wood (highly finished) is beautiful in the room.

1. Inputs to manufacturing unit

(a) Raw material requirements, intermediates and accessories per month

- (i) Planks and other woods;
- (ii) Nail, sand paper;
- (iii) Foam plywood, rexine, glue, etc.;
- (iv) Varnish;
- (v) Other polishing material.

(b) Utilities per month

(c) Other contingencies per month

(d) Fixed capital

(i) Land and buildings (rented)

- Land: 600 square metres
- Building area: 1,200 square metres

(ii) Machinery and equipment

- Heavy duty vertical bandsaw machine complete with electric motor suitable for 440/3/50 cycles supply starter, vee belt
- Dia of wheels - 18" 450 mm
- Width of wheels - 1 1/2" 38 mm
- (HP required - 1 HP)
- Hand Feed Surface Planner complete with guide fence, blade guard, cutter block with 3 steel knives complete electric motor starter, pulley and belt

- Cutter Head diameter 60 mm
 - Table size 500 x 170 mm

 - Indigenous make ball bearings fitted heavy duty motorised circular saw machine with heavy machine table, saw guard with electric motor starter, vee belt etc.
 - Dia of saw blade - 300 mm
 - Maximum depth of cut - 110 mm.
(HP required - 1 HP)
 - 1/2" capacity portable drill (wolf brand)
 - Portable, heavy duty sancer - 6" (wolf brand)
 - Saw sharpener and setter with 1/2 HP motor starter etc.
 - Hot iron brazin equipment with stand and forge
 - 18" knife grinding machine with 1/2 HP motor and starter, etc.
 - Electrical installation, power and light
 - Carpentry hand tools
 - Furniture for workshop and office equipment
- (iii) Electrical installation, power and light
(10 per cent of the cost of machinery and equipment)

Minimum cost of machinery and equipment: (ii) + (iii) =
Minimum total fixed capital : (i) + (ii) + (iii) =

(e) Process description

The planks are planed and cut in the cross cutting machine to the required length. Required design and curvings are made on the planks where necessary. The parts are then joined together with the help of a special nail (having both ends pointed), wooden pin, glue, etc. as deemed fit for the end product. Then products made are polished, varnished and furnished, and ready for dispatching.

(f) Personnel (skills and labour requirements)

Function	Number	Salary rate Per month	Total
Manager (owner)	1		
Carpenters	2		
Machine operators	3		
Clerk/accountant	1		
Helpers	3		
Watchman	1		
SUB-TOTAL			
Perquisites, 10 per cent of salaries			
TOTAL			

(g) Minimum total capital investment required to establish the unit

- (i) Minimum total fixed capital
- (ii) Minimum total working capital
 - Raw materials
 - Utilities
 - Other contingent expenses
 - Personnel

Minimum grand total capital
investment requirements:

2. Sources of raw materials

Raw materials are available locally. Planks and other wood are procured from the local market. They are seasoned in the open air as per requirement.

3. Sources of machinery and equipment and addresses of suppliers

When making inquiries, and in order to satisfy our requirements, please indicate if you would like to receive complete machinery and equipment or only some parts.

India

- (i) M/s. Maneklal and Sons, 115/116, Narayan Dhuru Street, Bombay-3;
- (ii) M/s. Jayems Machinery, 22, Brabourne Road, Calcutta-1;
- (iii) M/s. Varat Machinery, 288, Shakespeare Sarani, Calcutta-17;
- (iv) M/s. Perfect Machine tools, 123, Mount Road, Madras-6.

West Germany

Maschinenfabrik Robert Burkle GMBH & Co., P.O. Box 160, D-7290
FREUDENSTADT.

Switzerland

- (i) Uischer and Bolli AG, Zurichstrasse, 127, CH-8600, DUBENDORF;
- (ii) Wahli Freres S.A. Fabrique de Machines, CH-2735, BEVILARD;
- (iii) INVECTA AG, CH-5723 TEUFENTHAL;
- (iv) Fischer Georg Brugg Oehler AG, Wildschachen, CH-5200 BRUGG;
- (v) IRION;W. and P., Rauracherstrasse, 3, CH-425 RIEEN;
- (vi) REINHARD AG.H. Maschinenfabrik, CH-4950 HUTIWIL;
- (vii) Scheinder Hugo Maschinenbau, CH-5416 KIRHDORF;
- (viii) HILTI Aktiengesellschaft, FL-9494 SCHAAN;
- (ix) Oertli Werkzeuge AG Hochfelderstrasse, 11, CH-8180.
BULACH.

E5. WOOD SCREWS

Wood screws are considered as industrial fasteners and are mainly used in wooden furniture, electrical fittings and railway carriages. There is a high consumption of wood screws by building construction work and repair work.

1. Inputs to manufacturing unit

(a) Raw material requirements, intermediates and accessories per month

- Hard bright materials
- Polishing material
- Packing cartons

(b) Utilities per month

(c) Other contingencies per month

(d) Fixed capital

(i) Land and buildings (rented)

Building areas : 200 square metres

(ii) Machinery and equipment

- Heading machines producing wooden screws, length from 50 mm to 75 mm
- Heading machines producing wooden screws, length from 8 mm to 35 mm
- Slotting machines for light duty
- Slotting machines for heavy duty
- Threading machines for light duty
- Threading machines for heavy duty
- Polishing drums
- Pickling and cleaning vats
- Weighing scale
- Measuring instruments such as micro-meter, caliper gauges etc.
- Fixtures/dies
- Office equipment
- Working table, etc.

(iii) Installation and electrification charges

(10 per cent of the cost of machinery and equipment)

Minimum cost of machinery and equipment:

(i) + (iii) =

Minimum total fixed capital :

(i) + (ii) + (iii) =

(e) Process description

- (i) The wire is fed to an automatic heading machine where the head is formed and parting off done according to desired length;
- (ii) Slotting on the head is made on slotting machine;
- (iii) Threading is done on the thread cutting machine.

Then screws are degreased, pickled and polished in the polishing drums and finally packed in cartons.

(f) Personnel (skills and labour requirements)

Function	Number	Salary rate Per month	Total
Manager (owner)	1		
Foreman	1		
Accountant/storekeeper	1		
Clerk/typist	1		
Mechanic	1		
Skilled workers	2		
Unskilled workers	4		
Watchman	2		
SUB-TOTAL			
Perquisites, 10 per cent of salaries			
TOTAL			

(g) Minimum total capital investments required to establish the unit

(i) Minimum total fixed capital

(ii) Minimum total working capital

- Raw materials
- Utilities
- Other contingent expenses
- Personnel

Minimum grand total capital
investment requirement

2. Sources of raw materials

The raw materials are available locally.

3. Sources of machinery and equipment and addresses of suppliers

When making inquiries, and in order to satisfy your requirements, please indicate if you would like to receive complete machinery and equipment or only some parts.

India

- (i) M/s. Varat Machinery, 288, Shakespeare Sarani, Calcutta-17;
- (ii) M/s. Jaynues Machinery, 22 Brabourne Road, Calcutta-1;
- (iii) M/s. Batliboi and Co. Pvt., Ltd., Jeewan Vihar, Parliament Street, New Delhi
- (iv) M/s. Rama Industries, Rewari, Haryana.

West Germany

Maschinenfabrik Robert Burkle GMBH & Co., P.O. Box 160, D-7290
FREUDENSTADT

Switzerland

- (i) Uischer and Bolli AG, Zurichstrasse, 127 CH-8600, DUBENDORF;
- (ii) Wahli Freres S.A. Fabrique de Machines, CH-2735, BEVILARD;
- (iii) INYECTA AG, CH-5723, TEUFENTHAL;
- (iv) Fischer Georg Brugg Oehler AG, Wildschachen, CH-5200, BRUGG;
- (v) IRION;W. and P., Bauracherstrasse, 3 CH-4125, RIEHEN;
- (vi) KUPFERL & P., Thurstrasse 57, CH-3612, STEFIISBURG;
- (vii) Reinhard; AG.H. Maschinenfabrik, CH-4950 HUTIWIL;
- (viii) Schneider Ugo Maschinenbau, CH-5416, KIRCHDORF;
- (ix) HILTI Aktiengesellschaft FL-9494 SCHAAN;
- (x) Oertli Werkzeuge AG Hochfelderstrasse, 11, CH-8180, BULACH.

E6. WOODEN STORAGE SHELVES AND RACKS

The utilization of shelves and racks is a popular and better means of keeping and storing articles such as books, records, clothes, etc. Wooden storage shelves and racks are supplied to furnish shops and offices. They have certain advantages, particularly in the delivery of products, over steel shelves and racks. Wooden storage shelves and racks enjoy a ready market because of their multipurpose use and easy maintenance.

1. Inputs to manufacturing unit

- (a) Raw material requirements, intermediates and accessories per month

- (i) Wooden planks;
- (ii) Wood of various cross section;
- (iii) Varnish and other polishing material

(b) Utilities per month(c) Other contingencies per month(d) Fixed capital

(i) Land and buildings (rented per month)

- Land: 400 square metres
- Building area: 150 square metres

(ii) Machinery and equipment

- Hand feed surface planner complete with guide fence, blade guard electric motor, starter, etc.

(a) Cutter head diameter 60 mm;

(b) Table size - 500 x 700 mm;

(c) HP required - 1 HP.

- Heavy duty circular saw machine with table and saw guard electric motor, starter, etc.

(a) Diameter of saw blade - 300 mm;

(b) Max. Dept. of cut - 110 mm;

(c) HP required 1 HP.

- 1/2" capacity portable drill (wolf brand)
- 18" knife grinding machine with 1/2 HP motor and starter, etc.
- Carpentry hand tools;
- Furniture for workshop and office equipment

(iii) Electrical installation, power and light

(10 per cent of the cost of machinery and equipment)

Minimum cost of machinery and equipment (ii) + (iii) =

Minimum total fixed capital (i) + (ii) + (iii) =

(e) Process description

The planks and other woods are surfaced and cut to the required sizes in respective machines available. The parts are then joined together with the help of nails, wooden pins, glue etc. as deemed necessary for the end products. Finishing and painting are done as per the requirements of customers

(f) Personnel (skills and labour requirements)

Function	Number	Salary rate Per month	Total
Manager (owner)	1		
Carpenters	2		
Machine operators	3		
Clerk/accountant	1		
Helpers/cleaners	3		
Watchman	1		
SUB-TOTAL			
Perquisites, 10 per cent of the salaries			
TOTAL			

(g) Minimum total capital investment required to establish the unit

(i) Minimum total fixed capital

(ii) Minimum total working capital

- Raw materials

- Utilities

- Other contingent expenses

- Personnel

Minimum grand total capital investment requirements

2. Sources of raw materials

The raw materials are available locally. Planks and other woods are procured from the local market. They are seasoned in the open air as per requirement.

3. Sources of machinery and equipment and addresses of suppliersIndia

(i) M/s. Varat Machinery, 288, Shakespeare Sarani, Calcutta-17;

- (ii) M/s. Jaynues Machinery, 22 Brabourne Road, Calcutta-1, India;
- (iii) M/s. Batlipoi and Co. Pvt. Ltd., Jeewan Vihar, Parliament Street, New Delhi;
- (iv) M/s. Rame Industries, Reward, Haryana.

West Germany

Maschinenfabrik Robert Burkle GMBH & Co., P.O. Box 160, D-7290 FREUDENSTADT

Switzerland

- (i) Uischer and Bolli AG, Zurichstrasse, 12, CH-8600, DUBENDORF;
- (ii) Wahli Freres S.A. Fabrique de Machines, CH-7235, BEVILARD;
- (iii) INYECTA AG, CH-5723 TEUFENTHAL,
- (iv) Fischer Georg Brugg Oehler AG, Woldischachen, CH-5200 BRUGG;
- (v) IRION;W. and P. Rauracherstrasse, 3 CH-4125, RIEHEN;
- (vi) KUPFERL & P. Thurstrasse, CH-3612, STEFIISBURG;
- (vii) REINHARD AG, H. Bauracherstrasse, CH-4950 HUTIWIL
- (viii) Schneider Hugo Maschienbau, CH-5416 Kirchdorf;
- (ix) HILTI Akiengesellschaft, FL-9494 SCHAAN;
- (x) Oertli Werkzeyge AG Hochfelderstrasse, 11, CH-8180 BULACH.

F. Metal Working and Engineering

The following is the wide range of metal working and engineering items to be produced at small-scale level:

1. Manhole covers-C.I.
2. Weights
3. Circlips
4. Bright bars
5. Pressure die casing
6. Conduit pipes metallic
7. Flexible metallic pipe
8. Standard wire.
9. Machine shop vices
10. Mechanical jacks
11. Hydraulic jacks
12. Signal ladders
13. Street light fittings
14. Steel almirah
15. Steel vaults, safes and cash boxes
16. Meat and food safes - metallic cabinets - all types
17. Steel trunks
18. Tin containers unprinted
19. Buckets
20. Barrels
21. Drums
22. Tin trays
23. Bath tubes
24. Dust bins
25. Sanitary fixtures - metallic
26. Cocks and valves - water pipe fittings
27. Pipe fittings
28. Pressure stove
29. Wick stoves
30. Hurricans lanterns
31. Signal lamps
32. Hand lamps
33. Shoe tacks
34. Shoe eyelets
35. Umbrella ribs and fittings
36. Zip fasteners metallic
38. Tin cutters
39. Belt fasteners
40. Pilferproof caps
41. Gun cases
42. Doors, windows and ventilators
43. Rolling shutters
44. Lantern posts and bodies
45. Aluminium furniture
46. Adjustable beds hospital
47. Iron and steel costs - all types

48. Storage cupboards - iron and steel
49. Racks - all types including angular racks - iron and steel
50. Racks iron and steel
51. Wheelchairs for invalids
52. Steel chairs - all types
53. Steel table hospital
54. Steel tables - all other types
55. Trolleys - railway plat form drinking water
56. Trolleys iron and steel hospital
57. Stretchers iron and steel
58. Storage bins steel
59. Steel furniture all other types
60. Hacksaw frames
61. Pliers
62. Screw Drivers
63. Spanners
64. Hammers
65. Anvils
66. Wood working saws
67. Wrenches
68. Industrial knives
69. Nail pullers
70. Chisels
71. Pincers
72. Wire cutters
73. Other hand tools for blacksmith
74. Carpentry, handforging, foundry, etc.
75. Bolts and nuts except high tensile and other special types
76. Rivets of all types including bifurcated
77. Wire adjusting screws
78. Tumbler locks
79. Pad locks
80. Safe/cabinet locks
81. Door locks
82. Bicycle locks
83. Other locks
84. Lashing chains
85. Persian wheels
86. Chaff cutter blades
87. Chaff cutters
88. Animal driven implements
89. Crow bars
90. Plough shears/iron ploughs
91. Cultivators
92. Disc barrows
93. Insecticide dusters manual
94. Insecticide sprayers manual
95. Forks
96. Hoes
97. Levellers
98. Mowers

99. Pickers-metallic
100. Hand pumps
101. Seed treaters
102. Fund shovels
103. Sickles
104. Seed bins
105. Water lifters
106. Other agricultural implements
107. Wire nails
108. Wood screws
109. Machine screws - except socket head and special types
110. Gate hooks
111. Shoe nails animal
112. Hob nails
113. Builders hardware
114. Nail cutters
115. Metallic washers
116. Barbed wires
117. Spoons cutlery
118. Forks cutler
119. Table knives/household knives
120. Bread cutters
121. Other cuttler items
122. Domestic utensils (brass)
123. Domestic utensils (aluminium)
124. Domestic utensils (bell metal)
125. Domestic utensils (copper)
126. Domestic utensils (iron)
127. Domestic utensils (silver)
128. Domestic utensils (bronze)
129. Domestic utensils (German silver)
130. Pressure cookers
131. Gas appliances such as cooking ranges, ovens, etc.
132. Gas lighters - mechanical
133. Razors
134. Safety pins
135. Wack straps metallic
136. Umbrella parts
137. Domestic sewing machines
138. Beam scales
139. Postal weighing scales
140. Expanded metal
141. Welded wire mesh
142. Wire gauze and wire netting, metallic
143. Steel wool
144. Hair pins
145. Metal fittings for leather goods and garments
146. Blacksmith hearths
147. Brass dampers
148. Measuring types steel
149. Lamp holders
150. Winnowers

151. Wheat and rice threshers
152. Sheed cleaners
153. Shell huskers
154. Grain driers
155. Reapers
156. Cotton delinting machine
157. Sheed drills
158. Other agricultural machinery
159. Hand saw blades for cutting wooden logs
160. Coolant pumps
161. Steadies
162. Dog plates
163. Double can mixer dairy equipment
164. Micro pulveriser dairy equipment
165. Rottary driers dairy equipment
166. Basket type centrifuges dairy equipment
167. Milk Cooling and cheese settling equipment dairy equipment
168. Evaporating pans dairy equipment
169. Butter Churn dairy equipment
170. Curd mills dairy equipment
171. Agitators dairy equipment
172. Storage tanks for dairies
173. All poultry equipment

F.1. Automobile radiator cores.

The radiator keeps water circulation in the cylinder heads of engines at relatively constant temperature and thus prevent overheating of the engine. A radiator is also used in stationary types of engines. The design of a radiator varies according to the types of vehicles and different manufacturers of automobiles.

1. Inputs to manufacturing unit (capacity 100 pieces a month)

(a) Raw material requirements, intermediates and accessories

- Copper ingots
- Zinc ingots
- Tin ingots
- Lead ingots
- Sheets
- Chemicals, flux, etc.

(b) Utilities (per month)

(c) Other contingencies(per month)

(c) Fixed capital

- (i) Land and buildings (rented) per month:
 - built area: 300 square metres

(ii) Machinery and equipment

- Automatic Tube Drawing
- Automatic Strip Tinner
- Automatic Fin Roller Machine
- Heavy Duty Core Assembly Jigs
- Special Soldering Oven
- Header Plate Dipping Equipment
- Fluxing and Draining Equipment
- Guillotine Shearing Machine
- Capacity Drill Machine
- Double ended Pedestal Grinder
- Ball Press
- Compressor
- Squaring jig
- Dies, tools, fixtures, gadgets
- Installation Electrification
- Furnitures, office equipment

(iii) Installation and electrification charges:
(10 per cent of the costs of machinery and equipment)

Minimum total cost of machinery and equipment

Minimum total fixed capital

(i) + (ii) + (iii)

(e) Process description

The brass tubes are tinned and the sheets are also tinned in Automatic strip Tinner. The fins are punched and embossed out of Copper Strips in a Press Machine. The tubes and fins are assembled in Assembly Jigs. Then, the assembled cores are fluxed in Fluxing and Draining equipment. The cores are then baked and squared in a jig to take care of any deformation. The header plates are pressed in the machine and side bends are made by Hand Rolling machine. Then the Header plates are hot dipped in a solder bath and assembled with core. Before assembly, the cores should be subjected to pressure testing.

(f) Personnel (skills and labour requirements)

Function	Number	Salary rate per month	Total
Manager (engineer or mechanic with a long experience (owner)	1		
Mechanic-technician	1		
Clerk/accountant	1		
Salesman	1		
Skilled workers	2		
Unskilled workers	2		
Watchmen	2		
Casual labour	4		
Sub-total			
perquisites 15% of salaries			
Total			

(g) Minimum total capital investment required to establish the unit

(i) Minimum total fixed capital

(ii) Minimum total working capital

- Raw materials
- Utilities
- Other contingent expenses
- Personnel

Minimum grand total capital investment requirement

2. Sources of raw materials

The raw materials are available on the national market in some African countries. In other African countries the governments provide engineering manufacturers with facilities to import such raw materials as copper, zinc, tin, and lead ingots. In any case, it is recommended to contact the National Chamber of Commerce or Industry.

3. Sources of machinery and equipment and addresses of suppliers

India

- (i) International Machine Tools Corporation, 5 Bank Street, P.O. Box 799 Fort Bombay-400001,
- (ii) Power Tools and Appliances Co., 2, Dalhouse Square East, Calcutta-700001.

Japan

- (i) Moritani and Cie. Ltd., International Trading and Engineering 4-22 Yaesu 1-Chome, Chou-ku, Tokyo 103-91,
- (ii) "CECOCO", P.O. Box 8, Ibraki-Fu.

F.2. Dairy Equipment

The implementation of a food programme requires the availability of appropriate equipment for food preservation. As far as the preservation of milk is concerned, it is necessary to have storage tanks and other equipment in organised dairies. The following dairy equipment can be manufactured by small-scale manufacturing units:

- double cone mixer
- micro pulveriser
- rotary driers
- basket type centrifuges
- milk cooking and settling equipment
- butter churns
- curd mills
- evaporating pans
- agitators
- storage tanks

As indicated, the above mentioned items are necessary for preservation and processing of milk and milk products. Therefore, the small scale manufacturing units will have to be established in the African cities, as well as in rural areas, to cater for the demand of smaller dairies.

1. Inputs to the manufacturing unit

(a) Raw material requirements, intermediates and accessories per month

- stainless steel plates and sheets
- sheets rods etc.
- stainless steel rods and other sections

(b) Utilities per month

- postage
- stationery
- consumable stores
- repair and maintenance
- transport charges
- advertisement/publicity

(c) Fixed capital

(i) Land and building (rented per month)

covered area: 100 square metres

open area: 120 square metres

(ii) Machinery and equipment

- cutogen 5 oxyacetylene
- plate bending machine
- air cooled arc welding transformer 350 amperes
- welding rectifier set, 30 x 350 amperes
- argonarc welding equipment and accessories
- air compressor
- various penumatic tools such as chipping hammers, polishers, wire brushes, etc.
- flexible shaft grinder
- gas welding set with accessories
- universal radial drilling machine 250 mm capacity
- lathe height of centre 1770 mm capacity
- Bench drilling machine 15 mm capacity
- hacksaw machine 175 mm capacity
- 5 ton chain pulley block and travelling trolley with chain
- 5 ton hand operated gantry crane
- vessel rotator stands
- double ended bench grinder
- work bench with vices
- electrical drying oven
- hydraulic test pump
- furnitures and office equipment

(iii) Electrification and installation charges

(10 per cent of the cost of machinery and equipment)

Minimum total cost of machinery and equipment (ii) + (iii)

Minimum total fixed capital (i) + (ii) + (iii)

(e) Process description

Welding of stainless steel requires high skill in operation. Internal surface finishing require high polish, free from any scratch. All this aspects require high quality of skilled workmanship and supervision in welding and material handling. The main process involved for the making of bodies of the products are:

- cutting sheets to size either by shearing or gas cutting
- plate bending
- welding
- polishing and
- grinding.

(f) Personnel (skills and labour requirements)

<u>Function</u>	<u>Number</u>	<u>Salary rate per month</u>	<u>Total</u>
Manager-engineer	1		
Clerk/Accountant	1		
Skilled welders	3		
Skilled machinists	2		
Typist	1		
Semi-skilled workers	4		
Unskilled workers	2		
Apprentices	4		
Watchman	2		
Sub-total			
Perquisites, 15% of salaries			
Total			

(g) Minimum total capital investment reduced to establish the unit

- (i) Minimum total fixed capital
- (ii) Minimum total working capital

- Raw materials
- Utilities
- Other contingent expenses
- Personnel

Minimum grand total capital investment requirement

2. Sources of raw materials

In some African countries the national market can provide with the national or imported raw materials. But in the other African countries the Governments provide small scale manufacturers of metal and engineering products with facilities to import raw materials directly. In any case, it is recommended to contact the National Chamber of Commerce of Industry.

3. Sources of machinery and equipment and addresses of suppliers

India

- (i) M/s Indian Oxygen Ltd., Oxygen House, P-34
Taratala Road, Calcutta-700053
- (ii) M/s New Standard Engineering Co. Ltd., Ram Mandir Road,
Goregaon, Bombay-4000063
- (iii) M/s Ashok Bros., 37 Panchkuin Marg, New Delhi
- (iv) M/s Advani & Co. (P) Ltd., Advani Chambers, Sir
P.M. Road, P.B. No. 687, Bombay-400023

Japan

Tokyo Milk Machinery Co. Ltd., 9, 1-Chome Fukagawa Sarue-Cho
Koto-ku, Tokyo

West Germany

- (i) Becker, Gebr. Apparatbau, 472 Beckum, Postfach 96
- (ii) Meyer, H.F. Maschinenfabrik, 2430 Newstadt (Holstein)
Postfach 84
- (iii) Schroder, Wilh. G. Nachfolger GmbH, 2413 Lubeck-Schlitup
Industrie-Gelände Halle L45

USA

- (i) Gaulin Corporation, 44 Garden Street, Everett, Mass. 02149
- (ii) Allied Fisher Scientific, New York, 52 Faedem Road,
Spring Field, N.J. 07081, USA

Switzerland

- (i) Aluminium Schweisswerk Ag, Bernstrasse 63 CH-8952
Schlieren, Switzerland
- (ii) Brunner, Robert, Drunnergasse 1, CH-8302, Kloten

- (iii) Buznand S.A., Avenue de Morges 46-48, CH-1004
Lausanne
- (iv) Egli & Co. Joh. Inh. A., Egli Kirchgasse,
CH-96-06 Butschwill
- (v) Escher Wyss, Aktie Ngesellschaft, Escher-Wyss-Platz
CH-8023, Zurich

For designs and accessories of dairy equipments contact the following suppliers:

Finland

Finnagro OY, P.O. Box 80, SF 00101, Helsinki, Finland

Sweden

Alfalaval, Stockholm, Sweden

F.3. Hair Pins

Hair pins/grips are widely used by ladies of different ages all over Africa in large cities as well as in rural areas. There is a good market potential for these items.

1. Inputs to manufacturing unit (capacity = 2000 gross per month)

(a) Raw material requirements, intermediates and accessories per month

- spring steel wire
- enamel paint
- packing cartons

(b) Utilities per month

(c) Contingencies per month

(d) Fixed capital

(i) Land and buildings (rented) 100 square metres
Buildings area: 75 square meters

(ii) Machinery and equipment

- Automatic Hair Pins and hairgrips making machines 2- and 3" capacity complete with Dies. Electric Motor 2 HP, starter, etc.,
- Bench Drilling Machine ½" capacity with starter and ½ HP motor
- Painting Equipment i.e. Trays, Throughs Drip stands, Baking oven, etc.,
- Office Furniture and Equipment;
- Tools, etc.

- (iii) Installation and electrification charges:
(15 per cent of machinery and equipment)

Minimum cost of machinery and equipment:
(ii) + (iii) =

Minimum total fixed capital:
(i) + (ii) + (iii) +

(e) Process description

The wire is fed to an automatic machine where the pins or grips are formed to their final shape. After this operation, the pins or grips are painted by dipping in black paint and baked in an oven. The baked hair pins or grips are finally packed in cartons of one gross pins or grips each and ready for market.

(f) Personnel (skills and labour requirements)

Function	Number	Salary rate per month	Total
<u>Function</u>	<u>Number</u>		
Manager (owner)	1		
Clerk/accountant	1		
Mechanic	1		
Skilled workers	2		
Unskilled workers	4		

Sub-total

Perquisites, 15 per cent of salaries

Total

(g) Minimum total capital investment required to establish the unit

- (i) Minimum total fixed capital
(ii) Minimum total working capital

- Raw materials
- Utilities
- Other contingent expenses
- Personnel

Minimum grand total capital investment
requirement

2. Sources of raw materials

In some African countries the national market can provide with national or imported main raw materials. But in other African countries the Governments provide the small-scale metal and engineering manufacturers with facilities to import directly the raw materials. In any case, it is recommended to contact the National Chamber of Commerce or Industry.

3. Sources of machinery and equipment and addresses of suppliers

When making enquiries, and in order to satisfy your requirements, please indicate if you would like to receive complete machinery and equipment or only some parts.

India

- (i) M/s Indiana Trade Links, Sultanwind Road, Near Octori, Amritsar

Japan

- (i) Moritani and Co. Ltd., International Trading and Enginee-ring, 4-22, Yaesu 1-Chome, Chou-ku, Tokyo 103-91
- (ii) "CECOCO" Chou Boeki Goshi Kaisha, 9-29, Matsugamoto-Cho, Ibaraki, Osaka

West Germany

- (i) MRP Meyer, Roth and Past 02, Maschinenfabrik GmbH
- (ii) Raderberger Str. 202, Postfach 510829, D-5000, Kolin 51
- (iii) Voest-Alpine GmbH, P.O. Box 210324, Elsenheimerstrasse 59, D08 Munchen, 21.

F.4. Machine Screws

The development of manufacturing industries during the implementation of the Industrial Development Decade will increase considerably the demand of industrial hardwares like machine screws. Therefore, there is a sufficient scope for the establishment of more small-scale manufacturing units of machine screws in the large cities as well as in African rural areas.

1. Inputs to the manufacturing unit (Capacity 10 tons a month)(a) Raw material requirements, intermediates and accessories per month

- Low carbon steel wires in coils (suitable for cold forging) 5 mm to 20 mm in diameter are used.
- Hard bright wire

(b) Utilities per month(c) Contingencies per month(d) Fixed capital

- (i) Land and building (rented) per month
 - built area: 200 square metres

(ii) Machinery and equipment; Minimum cost:

- old heading machine of capacity range of screw diameter 6 mm to 10 mm;
- Head trimming machine of capacity 60 pcs/min.;
- Thread rolling machine capacity 100 pcs/min.;
- Screw head slotting machine capacity 100 pcs/min.;
- Tools, dies accessories, attachments, etc.;
- Polishing barrel;
- Double ended bench grinder with spare wheel;
- Furniture and office equipment.

(iii) Electrification and installation charges:

(10 per cent of the cost of machinery and equipment)

Minimum total cost of machinery and equipment

(ii) + (iii) =

Minimum total fixed capital

(i) + (ii) + (iii) =

(e) Process description

The material is fed in the cold heading machine and the head is formed in one end whilst the shank is pointed from the other end. The head fins are trimmed and threads on shanks are cut by thread rolling process. Then, a slot on head is cut in shitting machine for the screw driver and finally the screws are barrel polished.

(f) Personnel (skills and labour requirements)

<u>Function</u>	<u>Number</u>	<u>Salary per month</u>	<u>Total</u>
Manager Engineer	1		
Mechanic	1		
Foreman	1		
Clerk/Accountant	1		
Semi-skilled workers	4		
Helpers	2		
Watchman	2		

Sub-total

Perquisites, 15% of salaries

Total

(g) Minimum total capital investment required to establish the unit

(i) Minimum total fixed capital

(ii) Minimum total working capital

- Raw materials
- Utilities
- Other contingent
- Expenses
- Personnel

Minimum grand total capital investment requirement

2. Sources of raw materials

In some African countries the national market can provide with the national or imported main raw materials. But in other African countries the Governments provide small scale manufacturer of metal and engineering products with facilities to import raw materials directly, In any case, it is recommended to contact the National Chamber of Commerce or Industry.

3. Sources of machinery and equipment and addresses of suppliers

India

- (i) M/s K.B. Machinery Factory, 5-Harnam Singh, Ramagarish Marg (Sultan Wind Road), Amritsar
- (ii) M/S Goldman Automatics Pvt. Ltd., 75, Village Road, Bhandup, Bombay-4000073
- (iii) M/S Bwra Industrial Corporation G.T. Road, Putlighar, Amritsar
- (iv) M/S Willner & Co., 15 Richmond Road, Bangalore - 25

Japan

- (i) "CECOCO" Chou Boeki Goshi Kaisha, 9-29 Matsugamoto-Cho Ibaraki Osaka-pref
- (ii) Moritani and Co. Ltd., International Trading and Engineering, 4-22 Yaesu 1-Chome, Chou-ku Tokyo, 103-91

West Germany

- (i) MRP Meyer, Roth & Past 02, Maschinenfabrik, Gmbh
- (ii) Raderberger Str., 202 Postfach 510829, D-5000, Koln 51
- (iii) Voest-Alpine GmbH, P.O. Box 210324, Elsenheimstrasse, 59, D08, Munchen, 21

F.5 Mechanical Toys

There is a substantial demand for mechanical toys in Africa. The modern mechanical type of toys have an increased attraction for children. Actually, in large African cities as well as in rural areas, sophisticated type of toys are the main attraction in kindergardent schools. Therefore, while attractive designs become more and more evident, the demand for toys increases rapidly. Toys are prototypes of products already manufactured on a large scale and therefore are miniatures of actual products. The necessity of toys is to educate African children. Fundamental technical principals are taught by toys through observation made by children when they play their games. Children also learn technology when they try to maintain their toys. According to the designs, mechanical toys to be manufactured in this unit are subdivided into:

- (a) Dummy toys
- (b) Spring driven or weight (fly-wheel type)
- (c) Battery operated automatic toys

1. Inputs to the manufacturing unit (capacity 2000 pieces a month)(a) Raw material requirements, intermediates and accessories per month

- Tin plate
- Tin printing
- Brass
- Die cast toy bodies pinion sections
- Spring steel strips hardened & in ribbon rolls
- Rubber moulded wheels
- Wire
- Small screws, rivets
- Paints, chemicals
- Plastic moulded toy bodies
- Cotton waste, cutting tools, etc.

(b) Utilities (per month)

(c) Contingencies (per month)

(d) Fixed capital

(i) Land and buildings (rented) per month

Built area: 300 square metres

(ii) Machinery and equipment:

- treadle operated guillotine shearing machine
- bench type capstan lathe, length of bed 18" complete
- centre lathe ht. of centre 6½ bed length - 6 ft.
- power press - general type
- Hand press
- drilling machine
- double ended bench grinder 8" wheel dia
- shaper - geared type 1" stock
- Horizontal milling machine, bench type table length 24"
- wire straightening machine
- spray painting equipment with compressor
- hand lever shear
- dies, jigs and fixtures
- work benches, tables and racks, etc.
- office equipment and workshop furniture

(iii) Installation and electrification charges

(10 per cent of the costs of machinery and equipment)

Minimum total cost of machinery and equipment (ii) + (iii)

Minimum total fixed capital

(i) + (ii) + (iii)

(e) Process description

The process of manufacture of mechanical toys is divided into the following three major sections:

(i) Body or outer shape

The bodies for different toys can be made either from sheet metal and tin plates, or from plastic moulded material generally injection moulded.

(ii) Prime mechanism

The spring operated prime mechanism consists of a few gears operated by a spring whereby the motive is transmitted. Other movement are obtained through wire linkage. Laminating round washer plates to form a small fly wheel can be made by press for hand operated toys.

(iii) Assembly of the body and mechanism

(f) Personnel (skilled and labour requirements)

<u>Function</u>	<u>Number</u>	<u>Salary rate per month</u>	<u>Total</u>
Manager-mechanic (owner)	1		
Foreman	1		
Clerk/accountant	1		
Skilled operators	4		
Salesman	1		
Helper	1		
Packer	1		
Watchman	2		
Sub-total			
Prequisites, 15% of salaries			
Total			

(g) Minimum total capital investment required to establish the unit

- (i) Minimum total fixed capital
 - (ii) Minimum total working capital
 - raw materials
 - utilities
 - other contingent expenses
 - personnel
- Minimum grand total capital investment requirement

2. Sources of raw materials

The raw materials are available on the national market in some African countries. In other African countries the governments provide engineering manufacturers with facilities to import such raw materials as copper, zinc, tin, and lead ingots. In any case, it is recommended to contact the National Chamber of Commerce or Industry.

3. Sources of machinery and equipment and addresses of suppliers

India

- (i) M/S Maneklal & Sons, Narayan Dhuru Street, Fort, Bombay-1
- (ii) M/S Perfect Machine, Tools (Pvt.) Ltd.
- (iii) M/S Batliboi & Co., Jeevan Vihar, Parliament Street, New Delhi
- (iv) M/S Sagar Engg. Industries, Miller Ganj, Ludhiana
- (v) M/S G.R. Jessore Road, Calcutta

Hongkong

Andrews and Co., Ltd.
G.P.O. Box 2983

F.C. METAL WORKSHOPS

Metal workshops are places where the simplest metal ingot or metal sheet is converted into a completely different product. It is in this place that the designs and imaginations of an entrepreneur are translated into tangible products. Improvements of existing technology are exercised in metal workshops. The success and failure of such workshops depend on the technological zeal of the entrepreneur. The following information is based on activities already existing in Addis Ababa, Ethiopia. The purpose of this brief introduction of each activity is to indicate the possibility of starting the same activity in any other African country.

1. Metal Furniture Workshop

Products: Metal chairs, tables, beds and benches
 Machinery: Drilling, cutting, welding, polishing and pressing machines
 Estimated capital investment excluding building:
 Employment: 20 skilled persons
 15 unskilled persons

2. Metal Containers workshop

Products: Cans (one to twenty liters)
 Machinery: Slotting, welding, seaming and press machines
 One forklift
 Estimated capital investment:
 Employment: 10 skilled persons
 20 unskilled persons

3. Office Furniture Metal Workshop

Products: Filing cabinet
 Swivel chairs
 Brief cases
 Lampshades and safes
 Machinery: Cutting, welding, drilling and polishing machines
 Estimated capital investment:
 Employment: 5 skilled persons
 15 unskilled persons

4. Carbodies Metal Workshop

Products: Upper body of automobiles

Machinery: Cutting, welding, drilling, polishing, painting and bending machines

Estimated capital investment:

Employment: 20 skilled persons
60 unskilled persons

5. Large and medium size Welding Scales Workshops

Products: Live animal scales
Loaded lorry scale
Grain scale

Machines: Lathe, cutting, drilling, welding and painting machines.

Estimated capital investment:

Employment: 14 skilled persons
66 unskilled persons

6. Large Metal Containers Workshop

Products: Fuel tanks
Water tanks
Chemical tanks

Machines: Heavy duty welding, drilling and cutting machines

Estimated capital investment:

Employment: 20 skilled persons
50 unskilled persons

7. Camping equipment Workshop

Products: Tents of different sizes
Canvas beds
Portable tables
Chairs

Machinery: Cutting and welding machines
Sewing machines

Estimated investment:

Employment: 10 skilled persons
20 unskilled persons

8. Household Metal Furniture Workshop

Products: Chairs, tables, beds, mattresses and chrome plated shelves

Machinery: Cutting, welding and drilling machines
Estimated capital:
Employment: 10 skilled persons
10 unskilled persons

9. Sports wear and Equipment Workshop

Products: Football shoes
Sports apparel, uniforms
Ping pong tables
Nets
Physical exercise apparatus
Machinery: Knitting machine, shoemaking equipment,
metal casting foundry, sewing machine and
silk screening apparatus
Estimated investment.

10. Pre-fabricated Metal Workshops

Products: Beams, pillars, metal doors and windows,
gates and metal fences
Machinery: Cutting, welding, boring, drilling and lathe
machines, Heavy duty forklift
Estimated investment:
Employment: 40 skilled persons
110 unskilled persons

11. Electrical Stoves and Ovens Workshop

Products: Stoves and ovens
Machines: Cutting, welding, boring machines and
electrical equipment
Estimated investment:
Employment: 3 skilled persons
10 unskilled persons

12. Aluminium products Workshop

Products: Aluminium pots
Industrial aluminium kettles
Aluminium windows and doors
Machinery: Bending, drilling, welding and cutting
machines
Estimated investment.
Employment: 30 skilled persons
40 unskilled persons

13. Scrap Converters workshop

Products: Metal ingots
Spare parts, raw materials

Machines: Furnace equipment
Milling and lathe machines

Estimated investment.

Employment: 10 skilled persons
15 unskilled persons

14. Metal Sheet Workshop

Products: Gutters, pipes, buckets and water-tanks

Machines: Bending, welding and cutting machines

Estimated investment.

Employment: 2 skilled persons
5 unskilled persons

15. Upholestry Workshop

Products: Car-chair covers

Machinery: Sewing and cutting machines

Estimated investment:

Employment: 2 skilled persons
0 unskilled persons

16. Rubber Retreading Workshop

Product: Rubber products

Machinery: Rubber stamping machinery and moulds

Estimated investment:

Employment: 5 skilled persons
12 unskilled persons

17. Plastic Container Workshop

Products: Plastic cups, dishes, tumblers and lids

Machinery: Plastic extrusion machine, moulding equipment

Estimated investment:

Employment: 2 skilled persons
5 unskilled persons

16. Battery Maintenance Workshop

Product. Rectified battery
Machinery. Exchanger (AC to DC) and tester
Estimated investment:
Employment: One skilled person
5 unskilled persons

Source of machinery and equipmentLathe Machines

Breda S.P.A.
35010 CADONEGHE
Via I, Bordin, 50
Italy

Perico Baroni and Raimondi
20025 Legnano
Via Ciro Menotti, 201
Italy

Drilling & Boring Machines

G. Bluthardt Werkzeugmaschinen fabrik
7440 Nurtinger, Postfach 46

West Germany

Huller Hible GmbH Werkzeug Maschinen
7140 Ludwigsburg, Postfach 540
West Germany

AT.Re.MA. S.P.A
10135 TORINO
Italy

Milling Machines

Sachman S.P.A.
42100 Reggio Emilia
Via Masaccio 15
Italy

Sheetmetal Machines

Mariani
20038 Seregno
Via O. Visconti, 6-C.P.107
Italy

Welding Machines

Carl Canzler Apparate Und Maschinenbau
5160, Duren, Postfach 107
West Germany

Castol in GmbH
6239 Kriftel, Postfach 1120
West Germany

Plate Bending Machine

Sertom S.n.c.
Machine Lavorazione Lamiera
25060 Collebeato (BS)
Via E. Mattei, 6
Italy

Seaming Machines

Cevoloni Sip A
40100 Bologna
Via Creti, 16C.P.1728
Italy

F.7. Umbrella Assembly

Umbrellas are very commonly used in African countries to protect against rain. They can be also used in some African countries having hot climates to protect against the sun. There are different types of umbrellas used by gents, ladies and children. Since there are different climates in Africa the demand for umbrellas is expected to increase.

1. Inputs to manufacturing unit

(a) Raw material requirements intermediates and accessories per month

- Cloth
- Umbrella ribs
- Brass ring
- Seamless pipe
- Plastic handles
- Spring and clips
- Clotted cap pipe
- Thread spools
- Elastic tapes

Utilities per month

(c) Contingencies per month

(d) Fixed capital

- (i) Land and buildings (rented)
- Buildings area: 20 square metres

- (ii) Machinery and equipment
- Sewing machine

- (iii) Installation and electrification charges

Minimum cost of machinery and equipment:

(ii) + (iii) =

Minimum total fixed capital:

(i) + (ii) + (iii) =

(e) Process description

The cloth is cut to the size by used of a profile and stitched on sewing machines. All parts like ribs, cloth, brass ring, pipe, etc. are assembled together.

(f) Personnel (skilled and labour requirements)

<u>Function</u>	<u>Number</u>	<u>Salary rate per month</u>	<u>Total</u>
Manager (owner)	1		
Clerk/accountant	1		
Mechanic	1		
Skilled workers	2		
Unskilled workers	4		
Sub-total			
Perquisites, 15 per cent of salaries			
Total			

(g) Minimum total capital investment required
to establish the unit

- (i) Minimum total fixed capital
- (ii) Minimum total working capital
 - Raw materials
 - Utilities
 - Other contingent expenses
 - Personnel

Minimum grand total capital investment requirement:

2. Sources of raw materials

In some African countries the national market can provide with national or imported main raw materials. But in other African countries the Governments provide the small-scale metal and engineering manufacturers with facilities to import directly the raw materials. In any case, it is recommended to contact the National Chamber of Commerce or Industry to find addresses of foreign and local suppliers of raw materials.

3. Sources of machinery and equipment and
addresses of suppliers

When making enquires, and in order to satisfy your requirements, please indicate if you would like to receive complete machinery and equipment or only some parts.

India

- (i) M/S Sansar Sewing Machine, G.T. Road, Shahdara, India
- (ii) M/S Rita Sewing Machine Industry, Industrial Area, Ludhiana.

7.8. Wire Nails

Wire nails are widely used for fastening purposes. They are also used for industrial and domestic activities. There is an increasing demand for wire nails for wooden fabrications like packing cases, boxes, partitions, etc.

1. Inputs to the manufacturing unit (capacity 20 tons a month)
 - (a) Raw material requirements, intermediates and accessories per month
 - Hard drawn bright wire
 - (b) Utilities per month
 - (c) Contingencies per month
 - (d) Fixed capital
 - (i) Land and building (rented) per month:
 - built area: 100 square metres
 - (ii) Machinery and equipment
 - Wire nail making machine (automatic) size 20mm (3/4") to 75 mm (3")
 - Wire nail making machine (automatic) size 25 mm (1") to 30 mm (1 1/4")
 - Wire nail making machine (automatic) size 12 mm (1/2") to 50 mm (2")
 - Polishing barrel motorised with reduction gear arrangements
 - Bench grinder 12" wheel diameter
 - Tools and equipment
 - Office furniture and equipment
 - (iii) Installation and electrification charges
(10% of the costs of machinery and equipment)

Minimum total cost of machinery and equipment
(ii) + (iii) =
- (e) Process description

Coils of hard drawn bright wire are taken and fed to automatic nail making machines which are fitted with the proper heading dies, grips and cutting tools. In the machine, cold heading of the wire nail, and cutting of the nail are done automatically and the finished wire nails are thrown out. These wire nails are put into a polishing drum along with saw dust, leather pieces and similar items and rotated to get polished on the wire nails. Then they are packed as required, ready for the market.

(f) Personnel (skills and labour requirements)

<u>Function</u>	<u>Number</u>	<u>Salary rate per month</u>	<u>Total</u>
Manager (owner)	1		
Foreman	1		
Clerk/accountant	1		
Skilled operators	2		
Salesman	1		
Packer	1		
Watchman	1		
Sub total			
Perquisites, 15% of salaries			
Total			

(g) Minimum total capital investment required to establish the unit

(i) Minimum total fixed capital

(ii) Minimum total working capital:

- Raw materials
- Utilities
- Other contingent expenses
- Personnel

Minimum grand total

Capital investment requirement

2. Sources of raw materials

In some African countries the national market can provide with national or imported main raw materials. But in other African countries the governments provide small scale manufacturers of metal and engineering products with facilities to import raw materials directly. In any case, it is recommended to contact the National Chamber of Commerce or Industry.

3. Sources of machinery and equipment and addresses of suppliersIndia

- (i) M/S Burma Industrial Corporation,
G.T. Road, Puthigher, Amritsar, Punjab;
- (ii) M/S International Wire Products, 6, Rajput Para,
Rajkot-1, Gujarat
- (iii) M/S International Machine Tool Corporation, 5,
Bank Street, Behind State Bank of India, Fort,
Bombay-400023.

Japan

- (i) "CECOCO" Chuo Boeki Goshi Kaisha, 9-29 Matsugamoto-Cho
Ibaraki-Osaka-pref.
- (ii) Moritani and Co. Ltd., International Trading and
Engineering, 4-22 Yaesu, 1-Chome, Chuo-ku
Tokyo, 103-91

West Germany

- (i) MRP Meyer, Roth & Past, 02, Maschinenfabrik GmbH
- (ii) Raderberger Str. 202, Postfach 510829, D-5000
Koln 51
- (iii) Voest-Alpine GmbH, P.O. Box 210324, Elsenheimerstrasse
59, D08 Munchen-21.

PRODUCT AREA G: BUILDING MATERIALS

Providing shelter is one of the African population's basic needs called for in the Lagos Plan of Action. There is no sector of activity in which building materials and construction services do not play a part and the development of building materials and construction activities is well suited to both large and small-scale units. Increasing exploitation and industrial transformation of local natural resources into building and construction products is a powerful indicator of social infrastructures growth and material and economic well-being of the mass of the population.

African governments are paying more attention to urban housing compared to rural dwellings where the majority of their population is concentrated. The industrial development of building materials and construction in Africa is hampered by lack of special policies and back-up, institutional gaps, inadequate knowledge and utilization of local and raw materials, shortage of project finance, professional skills and trained labour, lack of indigenous technology development, lack of an appropriate research base.

Against the above background, small-scale industry development in building materials and construction should be promoted by African Governments through the financing and establishment of small units for the exploitation and transformation of building materials to meet the needs of the majority of the profiles, particularly those living in rural areas.

G.1 ASPHALTIC ROOFING SHEETS

1. Galvanized iron sheets and asbestos cement sheets are the conventional roofing materials in urban and semi-urban low-cost dwelling. Apart from being costly, they are mostly imported. In the few African countries where they are produced locally, their production has a high import content. In the case of rural dwellings and structures, the roofing is made of grass or straw thatch which has its drawbacks in terms of poor resistance to fungus attack and fire hazard and permeability to water and the frequency of repairs and replacement of the roof involves recurring expenditure. There is need to develop a low cost substitute roofing material.

Roofing sheets made from a mixture of waste paper, rags, agricultural fibre wastes and asphalt would be an ideal substitute and are being used in other regions. They are light-weight, can be installed easily by the dweller himself without requiring skilled masonry services and of low cost. A coating of paint provides necessary protection to the sheets against fungus attack and makes them waterproof. They do not require to be replaced frequently. While they cannot withstand too much load, their serviceability and durability under normal dwelling conditions is quite good. Apart from housing, they are being used in other regions in all types of semi-permanent structures including school rooms, industrial sheds, cattle and poultry farms, agricultural storage, etc. Life of the roofing sheets is about 5 years.

Their production may be undertaken as a rural industry or as woman's enterprise, as well. Investment is low and the production technology is extremely simple.

This profile relates to a production of 3000 sheets per month. (size 1.5 m x 1 m x 5 mm) they can be made into any dimensions and thickness.

(a) Raw material requirements

(per month)

- Asphalt
- Waste paper, or rags or agricultural fibre wastes
- Aluminium or other suitable durable paint

(b) Utilities (per month)

(c) Other contingencies (per month)

(d) Fixed capital

(i) Land and buildings

- Land 200 square metres
- Buildings 100 square metres

(ii) Machinery and equipment: Minimum cost

- Kneading machine (roller type)
- Sheet moulding press (semi-mechanical)
- Sheet cutter
- Paint sprayer
- Dryer
- Transport trolleys
- Electrical meters and accessories

Minimum total fixed capital

(e) Process description

Shredded waste paper/rags/agricultural fibre wastes are ground in slightly moist condition into a thick paste. The paste is impregnated with asphalt and spread evenly on a corrugated sheet mould (made of hard wood or sheet metal) layer by layer according to desired thickness and compacted with pressure. The compacting may be done mechanically or semi-mechanically or even manually. The sheets which are in semi stiff condition when released from the mould are placed in a dryer to lose their moisture and become fully hard. In dry condition, they are given a spray coating of aluminium or other suitable paint and ready for use. The sheets are fixed on the roof with the help of nails or screws as in the case of galvanized iron or asbestos cement sheets.

(f) Personnel (skills and labour requirements)

Function	Number	Salary rate per month	Total
Manager	1		
Accountant cum storekeeper	1		
Purchase/sales assistant	1		
Office secretary/typist	1		
Semi-skilled worker	3		
Unskilled workers	10		
Total			
Perquisites, 15% of salaries			
Total			

(g) Minimum total fixed capital required to establish the unit

(i) Minimum total fixed capital

- Land and buildings
- Machinery and equipment

Total

(ii) Minimum total working capital

- Raw materials
- Utilities
- Personnel
- Other contingencies

Total

GRAND TOTAL

2. Sources of raw materials

Asphalt from oil refineries/trade sources, waste paper and from trade sources. Agricultural fibre wastes from agricultural producers. Paints from trade sources.

3. Sources of machinery and equipment and addresses of suppliers

The kneading machine (which is a stone base grinder with rollers, the wooden/sheet iron moulding plate, and the semi mechanical moulding press and the dryer may be got fabricated from any metal working shop locally. The paint sprayer and electrical motors are standard items of equipment available from hardware shops.

4. Sources of technical consultancy and plant engineering services

Ghana

Building and Road Research Institute
UPO Box 40, Kumasi

United Republic of Tanzania

Building Research Unit
P.O. Box 1964
Dar-es-Salaam

India

Industrial Technical Services Private Ltd.
147 Cremas Road, Madras 600086

Light Roofings Limited
125 Ldeyds Road, Madras 600086
Madras

G.2. CERAMIC TILES

1. Ceramic tiles, in glazed or unglazed condition, are one of the building materials used in indoor and outdoor applications in urban residential and commercial buildings. With their use, cement plastering and painting of walls as a protection to the brickwood is unnecessary. The tiles have both functional and decorative value. They are made from white - burning china clays but can also be made from red clays and glazed. Tiles prepared from china clays are stronger and more durable.

This project profile relates to a production capacity of 30 tonnes per month (equivalent to 6000 dozen tiles). The normal size of the tiles is 150 mm x 6 mm. A small part of the production may include, if found necessary, medium and midget sized namely 100 mm x 100 mm x 6 mm and 25 mm x 254 mm x 4 mm. The midget tiles can also be used in flooring.

Wood, if available, may be used as fuel for the kiln. Alternately, coal or fuel may be used.

(a) Raw material requirements (per month) (per month)

- China clay
- Felspar
- Quartz
- Limestone or marble
- Talc
- Miscellaneous chemicals for glazing
- Fireclay and its grog for making saggars
- Fuel (wood)
- Packing materials

(b) Utilities (per month):

(c) Contingencies (per month)

(d) Fixed capital

(i) Land and buildings

- Land 300 square metres - building 150 square metres

(ii) Machinery and equipment

- Jaw crusher
- Rug mill
- Ball mill
- Small pot mills
- Blunger
- Electromagnet and screen
- Slurry pump
- Filter press
- Tile press with different moulds (semi-mechanical)
- Dryer (based on waste heat from the kiln)
- Down-draft kiln (10 tonnes capacity)

- Pyrometer
- Burners (if oil is used as fuel)
- Wooden trolleys
- Electrical motors and accessories
- Office furniture and equipment

(e) Process description

Specific proportions of quartz, felspar and limestone are crushed first and ground together with china clay and water in a ball mill into a fine mixture. It is then fed into a blunger which keeps it in a state of suspension. Periodically, the slurry is pumped into a filter press and compacted into a stiff-mudcake with the expulsion of the water of formation. The cake is dried in order to pulverize it easily. The dry tiles are coated with a glaze (prepared separately from almost the same finer raw materials but in different proportions) stacked inside saggars (fire clay boxes) and baked gradually to a temperature of 1100 degrees C., cooled packed and marketed. The entire cycle of baking and cooling takes 8-10 degrees C. to harden it and apply the glaze and re-bake it at 1100 degrees C. in a two stage operations.

The glaze frit is prepared by melting the mixture of the various raw materials in a clay crucible and quenching the melt in cold water so as to shatter it into easily grindable condition. The powder is ground along with water and clay in a small pot mill into a fine slurry. The side of the tile to be glazed is dipped in the slurry. The tile when dry is baked as explained earlier.

The plant operations have considerable scope for employment of women, except for the kiln work.

(f) Personnel (skills and labour requirements)

Function	Number	Salary rate per month	Total
Ceramic technologist cum plant manager	1		
Purchase/sales assistant	1		
Accountant/storekeeper	1		
Office secretary/typist	1		
Skilled workers	6		
Unskilled workers	10		
Total			
Perquisites, 15 % of salaries			
Total			

(g) Minimum total investment required to establish the unit

(i) Minimum total fixed capital

- Land and building
- Machinery and equipment

(ii) Minimum total working capital

- Raw materials
- Utilities
- Personnel
- Contingencies

Total

2. Sources of raw materials

The primary raw material (china clay or kaolin) is known to occur in Algeria, Angola, Burundi, Egypt, Ethiopia, Kenya, Madagascar, Mozambique, Nigeria, Swaziland and United Republic of Tanzania. The other two basic raw materials (quartz and felspar) are available in Egypt, Kenya, Madagascar, Mozambique, Nigeria, and Zambia. However, this list is not exhaustive. A reference may be made to the Department of Mines and Geology in respective countries for information on the sources of supply of the three basic materials as well as of limestone, marble, talc and fireclay. Some special chemicals require for making the glazes and colours may have to be imported.

3. Sources of machinery and equipment and addresses of suppliersFederal Republic of Germany

- (i) Dorst Keramik machinen Bau, 8113, Kochel- am - See Mitten Walder
- (ii) Buhler niag GmbH, Post Fach 3369, 3300 Braunschweig
- (iii) Laeis - Worke AG, 5500 Trier (mosel) Post fach 2560
- (iv) Dubois and Co., Elsengleberie, Abt. maschinenbau, 5100 Anchen, Julicher Strasse 334

India

- (i) Rusum Engineering Company, 25, Swallo Lane Calcutta
- (ii) Arun Engineering Works Goindal Road, Rajkot
- (iii) Other sources may be contacted through the Federation of Indian Chamber of Comemrce or Industry. Barakhamba Road, New Delhi 1

Japan

Sources may be contacted through Japan Consulting Institute, Yurako - Cho, Tokyo

Korea

Hankuk Ceramic Co., Ltd, 79 Jacsong-dong, Dagnae-ku, Busan

Switzerland

- (i) Bau and Industrie Ag., Industrie Strasse CH-4415
Laussane
- (ii) Keramische Industrie Laufen Ag fur, Wahlen strasse 46

United Kingdom

- (i) Bradley and Graven Limited, Wakefield, Yorks
- (ii) Other sources may be contacted through the British Ceramic
Association, Stoke-on-Trent, North Staffordshire
- (iii) William Boulton Ltd., Providence House, Navigation Road,
Burslem, Stoke-on-trent, Staffs ST6 3BQ

G.3. RICE HUSK ASH MASONRY CEMENT

1. Rice husk is a waste material from rice milling operations and is generally disposed of locally as an ingredient in cattle food or domestic fuel. If incinerated into ash, it acquires pozzolanic properties and in admixture with lime and water, become a good masonry binding material for use in place of ordinary portland cement in constructions (except for RCC and prestressed concrete work). Rice husk ash can also be blended with ordinary portland cement to produce portland pozzolana cement for high strength constructions. A mixture of the rice husk and lime sludge can be formed into sand-lime bricks and blocks without conventional autoclaving for use as substitute for fired clay bricks. In many rice-producing countries in the Asian region, rice husk ash masonry cement is attracting interest for use as mortar for brickwork, plaster, lining of canals and drains, foundations, pavements, grain storage bins and low-cost housing.

With nearly 40 African countries engaged in rice cultivation, the total quantity of rice husk available in the region is about 2 million tonnes per year. One ton of rice (paddy) yields 200 kgs of husk which, on incineration, turns into 40 kg of ash. 40 kg of ash mixed with 20 kg of hydraulic lime yields 60 kg of rice husk ash masonry cement for the building trade. Alternatively in the proportion of 3 parts of ash to 1 part of ordinary portland cement, it may be converted into Portland Pozzolana cement. Either way, the potential for the production of rice husk ash masonry cement in terms of raw materials as well as building applications is quite large.

Its production is also simple. The scale of production is quite flexible according to needs.

Above all, it is ideal for promoting as a rural industry and women's enterprise. This profile relate to a production capacity of 60 tonnes per month. The plant of this size may be set up wherever there is a rice hulling facility capable of processing at least 1,000 tonnes of paddy per year.

(a) Raw material requirements

- Rice husk	200 tonnes
- Limestone	25 tonnes (or lime sludge waste if available locally from sugar, pulp and paper and leather tanning plants)
- Firewood	8 tonnes
coal	4 tonnes)

(b) Utilities (per month)

(c) Other contingencies (per month)

(d) Fixed capital

- (i) Land and buildings:
- Land 50 square metres
 - Buildings 20 square metres

(ii) Machinery and equipment

- Incinerator kiln (brick wood construction)
(capacity 2 tonnes per day)
- Lime burning kiln (brickwood construction)
(capacity 0,5 tonnes per day)
- Ball mill
- Weighing machine
- Begging machine
- Electrical motors and accessories

Minimum total fixed capital (i) + (ii)

(e) Process description

The two methods of producing rice husk ash masonry cement are as follows:

(i) to mix rice husk with lime sludge waste (obtained from sugar, pulp and paper leather tanning or fertilizer plant and water into thick paste, form balls, dry in sun, burn it in an incinerator and pulverize in a ball mill into fine powder for use. In this form, it is a self-setting cementing material;

(ii) to burn rice husk into ash in an incinerator, mix the ash with the hydraulic lime and pulverize in a ball mill into fine powder for use.

This incinerator is a brick work kiln. The fuel generally used is firewood or agricultural wastes or coal and the temperature of incineration is 900 deg.C.

Lime, the co-raw material, may be produced in the same plant but in another brickwood shaft kiln from limestone. Alternatively it may be purchased from other sources in the form of hydrated lime or lime sludge waste from sugar, pulp and paper and fertilizer plants, in which case the investment on a lime kiln will be unnecessary.

The rice husk ash incinerator may be operated intermittently or continuously depending on the market.

(f) Personnel (skills and labour requirement)

Function	Number	Salary rate per month	Total
Manager cum chemist	1		
Accountant cum storekeeper	1		
Purchase/sales assistant	1		
Office secretary/ typist	1		
Semi-skilled workers	3		
Unskilled workers	9		

Total
Perquisites, 15% of salaries

Total

(g) Minimum total investment required to establish the unit

(i) Minimum total fixed capital:

Land and buildings
Machinery and equipment
Total

(ii) Minimum total working capital

Raw materials
Utilities
Personnel
Other contingent expenses

Grand total

2. Sources of raw materials

Rice mills are the main source of supply of rice husk. Lime sludge, if used, may be obtained from plants producing sugar pulp and paper, ammonium sulphate, soda ash, calcium carbide and acetylene plants or leather tanneries or commercial sources. In case lime is to be produced captively, limestone may be obtained from cement plants.

3. Sources of machinery and equipment and addresses of suppliers

The main item of equipment namely the ash incinerator (and also the lime bruning kiln in case lime is to be produced in the same plant) is entirely a brickwood construction and has to be fabricated at site. Other items of equipment (ball mill, weighing and bagging machine and electrical motors) may be obtained from commercial source.

4. Sources of technical consultancy and plant engineering services

Ghana

Building and Road Research Institute UPO Box 40, Kumasi

India

Central Building Research Institute Roorkee (U.P.)

Cement Research Institute of India M-10 South Extension part II, New Delhi 110049

Indian Institute of Technology (Dept. of Metallurgical Engineering), Kanpur 208016

Malaysia

Jitra Cement Products Sdn. Bhd. P.O. Box 120, Alor Sectan, Kedah

Nepal

Research Centre for Applied Science and Technology Tribhuvan
University, Kintipur, Kathmandu
Pakistan Council of Scientific and Industrial Research Press
Centre, Kemal Ataturk, Karachi 01909

Sri Lanka

National Engineering Research and Development Centre of Sri Lanka
NERO Centre, Ekala, Ja-ela

Thailand

Building Material Laboratory Thailand Institute of Scientific and Technological
Research 196 Abahonythin Road, Banghén, Bangkok

United Kingdom

The Intermediate Technology Development Group 9 King Street,
London WC 2 E8 HN

USA

College of Engineering Dept. of Civil Engineering, Division of Structural
Engineering and Mechanics University of California, Berkely, California 94720

G.4. LIME

1. Lime is a good substitute binder material for use in place of cement in several types of low-cost constructions, particularly housing. As a building material, it can be used as mortar, plaster and ordinary white-wash. Its other uses are in road construction, production of stabilized soil blocks and bricks, agriculture, leather tanning, and production of cement iron and steel, ceramics, sugar, pulp and paper and chemicals. Its production is simple and can be undertaken even as a rural or artisanal activity. The scale of production is flexible according to the size of demand and investment capacity. Also, the production can be continuous or intermittent according to requirements.

The basic raw material for lime production is limestone. Dolomite, marble, coral and sea-shells are some of the alternate materials. Firewood, agricultural wastes like shells of coconut, palm, groundnuts, cashew, etc. Coal or a mixture of all these are the fuels which are generally used. The coal may be bituminous grade of calorific value of 6,500 calories and ash content 15-20 per cent; Modern kilns are based on fuel oil for larger outputs. This profile relates to production capacity of 100 tonnes per month.

(a) Raw material requirements (per month)

Limestone
200 tonnes (or dolomite, marble, coral or sea shells)
Firewood 67 tonnes (or 33 tonnes of coal or 150 tonnes of
agricultural/cattle wastes
packing bags (25 kg capacity) 4000 nos.

(b) Utilities (per month)

(c) Other contingencies (per month)

(d) Fixed capital

(i) Land and buildings

- Land 250 square metres
- Buildings 120 square metres

(ii) Machinery and equipment

- One lime kiln (with bucket elevator arrangement)
(calcining capacity 3 tonnes per day)
- Jaw crusher
- Weighing machine (100 kg capacity)
- screen mesh
- Electrical motors and accessories
- Radiation pyrometer
- Lime hydrator (Capacity: 3 tonnes per day)

- Bagging machine (capacity: 120 bags per day)
- Minor laboratory equipment and chemical (for routine testing)
- Office furniture and equipment

Minimum total fixed capital

(e) Process description (Batch method)

The process of lime production consists of two stages. In the first stage, limestone (or dolomite or coral or sea shells) is crushed to small size (3 to 3 cm) in a jaw crusher and calcined in a kiln at a temperature of about 1000 degrees centigrade in order to produce quick lime. Quick lime is unstable and the second stage consists of converting it into a stable form, namely hydrated lime by slaking it with water, manually or mechanically.

The fuel for the calcination is generally firewood or coal or coke or fuel oil. Agricultural wastes like shells of coconuts, palm cashew and groundnuts as well as cattle waste (dried) may also be used but their fuel efficiency is less.

Limestone and firewood (or coal) are fed into the kiln through the open top; stacked in alternate layers and calcined. The proportion of limestone and firewood is 3 parts to 1 part of firewood (or 6 parts of lime to 1 part of coal). The calcined material is discharged from the side draw-hot located in the base of the kiln, then spread on a cement or stone platform and quenched with water to slake it into quicklime. The resulting quicklime which is a fine white powder is then bagged and marketed. The slaking is done in a hanical hydrator, but also can be done manually.

(f) Personnel (skills and labour requirements)

Function	Number	Salary rate per month	Total
Manager cum chemist	1		
Accountant/sales assistant	1		
Purchase/ sales assistant	1		
Office secretary/ typist	1		
Semi-skilled workers	3		
Unskilled workers	6		

Total

Perquisites, 15% of salary and wages

Total

(g) Minimum total investment requirement to establish the unit

(i) Minimum total fixed capital:

- Land and buildings
- Machinery and equipment

(ii) Minimum total working capital

Raw materials

Utilities

Personnel

Other contingent expenses

Total

2. Sources of raw materials

The basic raw material in the form of natural deposits of limestone, marble and chalk or marine deposits of coral or sea shells is available in most African countries. The department of Mines and/or Information of Sources supply of the materials.

3. Sources of machinery and equipment and addresses of suppliers

The main and most important item of equipment required for lime production is the calcination kiln which is essentially a brickwork structure and has to be constructed at site with the help of standard design drawings and local masonry services. The drawings may be purchased from lime producing firms or furnace designers. Technical consultancy and engineering organization building materials research centres and technical departments attached to Ministry of Industry in respective countries may also be able to provide guidance on the sources of supply of design drawings as well as of other items of machinery. The following organizations may be contacted:

Ghana

Building and Road Research Institute UPO Box 40, Kumasi

Ethiopia

Building Construction Authority (Research and Development Section) P.O. Box 4074, Addis Ababa

United Republic of Tanzania

Building Research Unit, P.O. Box 1964 Dar-es-Salaam
Tanzania Saruji Corporation P.O. Box 4123, Dar-es-Salaam

Small Industries Development Organisation (SIDO) P.O. Box 1278, Arusha

Tanzania Industrial Studies and Consulting Organization P.O. Box 2650, Dar-es-Salaam

Togo

Centre de la construction et du Logement Cacavelli, P. Box 1762, Lome

Benin

Centre National d'Essais et de Recherches des travaux publiques (ONERTP) B.P. 1270 Cotonou

Tunisia

Société Tunisienne des Industries de matériaux de construction (SOTIMACO)
2 Place Barcelkona, Tunisie

India

Central Building Research Institute Nirman Bhavan, Maulana
Azad Road, New Delhi 110001

Cement Research Institute of India M-10 South Extension Part II
New Delhi 110049

Khadi and Village Industries Commission 3, Irla Road, Vile
Parle West, Bombay, 400056

Lime Manufacturing Association 10 Alipur Road, Delhi.

Czechoslovakia

Research Institute for Ceramics., Refractories and Raw
Materials P.O. Box 211, 305 11 Plzen

France

Centre Scientifique et Technique du Bâtiment 4 Avenue du
Recteur Poincare 75782, Paris Cedex 16

UK

The Intermediate Technology Development Group 9 King Street
London, W.C. 2 E8 HN

Federal Republic of Germany

Bundesverband der deutschen Kalkindustries e.v. Bauverlab BmbH,
Weisbaden, Demag AG, Duisburg

Denmark

F.L. Smidth Company DK-2500 Copenhagen

Indonesia

Directorate of Building Research 84 Jalan Tamansari, Bandung

H. RURAL HOUSEHOLD PRODUCTS

H.1 WASHING SOAP

1. This project profile relates to a production capacity of 25 tonnes washing soap cakes per month equivalent to 300,000 cakes.

The production can be undertaken as a rural industry and also as a women's enterprise.

The production does not involve elaborate technology or equipment.

(a) Raw material requirements (per month)

- Vegetable oils (based on coconut or palm or groundnut or cotton seed etc.).
- Tallow.
- Caustic soda lye
- Sodium silicate
- Salt
- Fuel (firewood)

(b) Utilities (per month)

- water.

(c) Contingencies (per month)

- Stationery and postage
- Consumable stores
- Sprons and gloves

(d) Fixed capital

(i) Land and buildings

- land 300 square metres
- building 200 square metres

(ii) Machinery and equipment

- Mild Steel Kettles
- Mild steel cylindrical pans
- Mixing rods

- Soap moulds
- Cutting machine (hand operated)
- Soap stamping machine (hand operated)
- Wooden trolleys and pallets

Minimum total fixed capital

(e) Process description

A wide range of vegetable oils (coconut oil, palm oil, groundnut oil, cotton seed oil etc.), is available for soap making and a choice may be made according to local resources and availability of oils.

Vegetable oil and tallow constitute the chief raw materials for soap making.

The oil charge is heated in a pan to a temperature of approximately 70 degrees C. to melt down the fat content. Firewood (or coal if locally available) may be used as fuel. Specified quantity of caustic soda solution is added to the melt and finally the fats and oil get decomposed. Sodium silicate is also sometimes added to the mix as a filler. The melting finally results in saponification and a thickening of the emulsion takes place. Salt water is also added at this stage. The heating is withdrawn and the soap material is placed in a mould-frame to cool, and solidify and dry, whereafter it is cut to size, trimmed, stamped (if required) and marketed.

All the machinery can be hand operated without requiring electric power.

(f) Personnel (skills and labour requirements)

<u>Function</u>	<u>Number</u>	<u>Salary rate per month</u>	<u>Total</u>
Manager cum chemist	1		
Accountant cum storekeeper	1		
Purchase/sales assistant	1		
Office secretary/typist	1		
Semi-skilled workers	3		
Unskilled workers	10		
Total			
Perquisites, 15% of salaries			
Total			
Say			

The employment can be exclusively on women labour if required.

(g) Minimum total investment required to establish the unit

(i) Minimum total fixed capital

- Land and building
- Machinery and equipment

Total

(ii) Minimum total working capital

- raw materials
- utilities
- Personnel
- Contingents

Total

Grand total

2. Sources of raw materials

Vegetable oils may be obtained from oil-exPELLING mills or government supplies or trade sources. Tallow, caustic soda, stearic acid and sodium silicate may be obtained from chemical plants or trade sources. It is likely that in some countries caustic soda may have to be imported. Local pulp and paper plants, textile mills and aluminium plants are also likely sources of supply of caustic soda if they have surplus available. Enquiries for information of sources of supply of the various materials may also be addressed to the Ministry of Industry and the Chamber of Commerce in respective countries.

3. Sources of machinery and equipment and other contacts for suppliers

Canada

The Canadian Manufacturers Association. Toronto

Czechoslovakia

Czechoslovak Chamber of Commerce and Industry. Argentinska 38.
170 05 Prague 7

France

- (i) Appareils et evaporateurs Kestner 7 rue de Toul.
B.P. 44
5r 9003 Lille
Cedex T. (20) 93-46-24

- (ii) CIFAL (Ingeniere - Enterprise Generale) 46 Avenue d'Ivry,
75645 Paris Cedex 13T584-11-40
- (iii) Grenier - Charvest SA, 100 Avenue au mail
B.P. 1244
350113 Rennes Cedex T99)59-16-90
- (iv) Ultrafine (Ste),
46 Rue de Doual
75009 Paris T.526-25-90

Federal Republic of Germany

- (i) Weber and Seelender maschinenfabrik Postfach 1520
3320 Helmstedt
- (ii) Gustav Elrich maschinenfabrik
Postfach 1160, 6969 Hardheim
- (iii) Association of German Machinery Manufacturers
D-6000 Frankfurt

German Democratic Republic

Chamber of Foreign Trade of GDR D.D.R. - 1080 Berlin
Schadow Strasse 1

Hungary

Hungarian Chamber of Commerce
P.O. Box 106
H-1389 Budapest, Hungary

India

Corporated Engineers, 7 Chittranjan Avenue, Calcutta 1
Jay Bharat Engineering Works
Lal Kuan - Delhi

The National Small Industries Corporation
New Okhla - Industrial Estate
New Delhi 110020

Federation of Indian Export Organizations
Allahabad Bank Building
17 Parliament Street New Delhi 110001

Japan

Japan Consulting Institutes 1-1 Yuraka-Cho
Chiyoda-ku tokyo

Korea

Korea Society for the Advancement of Machine Industry
(KOSAMI) 1-643, Yuao suido-Dong Yeogduego-gu Seoul

Sweden

Swedish Export Council P.O. Box 5513
5-1485 Stockholm

Switzerland

Swiss Office of the Development of Trade Dept. H.
P.O. Box CH-8005 Zurich.

While ordering the machinery from the above sources, it is advisable to specify the extent of mechanisation proposed to be adopted for the production and to specify that the production will be washing soaps only.

It may also be possible in some countries to avail of the existing engineering fabrication facilities and get some of the required machinery fabricated locally.

H2. SAFETY MATCHES

Safety matches are items of daily rural and urban need. In many countries in the Asian region, its production is generally undertaken as a cottage industry on the basis of subcontracting parts of the production operation like coating the matchsticks preparing the boxes, labelling, packing, etc.. The production process is quite simple and amendable to such type of enterprise, mostly based on women labour. It is feasible to undertake production of safety matches in African countries in small units with suitable arrangements for regular supplies of some of the basic materials like matchstick splints, special chemicals and wrapping due paper. Some of these materials may involve import in some countries. To encourage the development of local match industry in the small scale and rural sector, Government agencies concerned with procurement or distribution of imported materials may assist this industry since the materials involved are also required in several other industries and are perhaps already being imported.

This project profile relates to a production of 1 500 gross per month (equivalent to 216 matchboxes of standard size and content of 50 matchsticks per box) based on self-contained operations (that is, without subcontracting any part of the work among the households even within the community). Such subcontracting if done would considerably reduce production costs without reducing the sales realization.

(a) Raw material requirements (per month)

There is a slight difference in the raw materials which make up the chemical mixture for the matchstick head and that for the igniting edge of the box. The raw materials required are as follows"

(i) For matchstick

- Soft matchwood or sized splints
- Potassium chlorate
- Manganese dioxide
- Sulphur
- Ferric oxide
- Paraffium wax
- Powdered glass (ordinary glass)
- Rosin
- Glue
- Fuel (firewood)

(ii) For matchbox (outer shell and inner box)

- Soft wood peeling
- Red phosphorous
- Antimony sulphide
- Potassium dichomate
- Powdered glass (ordinary glass)
- Glue
- Blue wrapping paper
- Labels

(b) Utilities (per month)

- Water
- Power (optional)

(c) Contingencies (per month)

- Postage and stationery
- Consumable stores
- Miscellaneous items

(d) Fixed capital

(i) Land and building

land 200 square metres
building 100 square metres

(ii) machinery and equipment

- Matchstick splicing machine
- Mild steel sheets
- Weighing scale
- Mortars and pestles for grinding chemicals
- Mixing pots
- Mild steel dipping tanks
- Wooden racks (for housing the dipped splints)
- Iron pans for glue preparation
- Boxwood splicing machines (optional)
- Paper cutting machine

- Drying chamber
- Wooden trolleys and trays
- Miscellaneous hand tools
- Office equipment and furniture

The machine can be hand-operated. If electric power is available, the operations may be semi-mechanized.

(e) Process description

Matchwood purchased from joinery mills in cut sizes are spliced into matchstick splints (size 2 sq mm diameter) in a cutting machine. The splints are placed in wooden mould frames which contain a series of grooves shaped to splint size a small portion of the end of the splints sticking out of the mould. These protruding ends of the dipped end up on a hot solution of paraffin wax and afterwards placed, with the dipped end up on a hot steel plate which is kept heated from below by a slow fire. The paraffin melts and impregnates the matchstick splints, and makes them ready for coating their ends with the inflammable chemicals mixture.

The chemical mixture is prepared separately. Finally ground potassium chlorate, potassium dichromate, manganese dioxide, iron dioxide, ordinary glass powder and rosin are added to a hot solution of glue thoroughly stirred and mixed to a homogenous plastic mass. The mass is then ground with water made into a thick slurry and transferred to dipping tanks which are kept in a hot condition over a fire. The ends of the dry splints are dipped into this solution so that the mixture of chemicals from a small globule at the end of the splint and gradually set hard, this operation is known as head-cutting.

The next operation consists of making the match box and coating its two covered edges with chemicals. The thin wood sheets (also obtained from joinery mills) are cut to size and shaped to the outer and the inner portions of the matchbox and blue paper is wrapped over the portions with glue. The igniting surface on the outer cover is then prepared by applying a coating of a finely ground hot wet mixture of antimony sulphide, red phosphorous glass powder and potassium dichromate and rosin and drying. (50 pieces to a box) are packed in the box and marketed.

(f) Personnel (skills and labour requirements)

Function	Number	Salary rate per month	Total
Manager cum chemist	1		
Accountant cum storekeeper	1		
Purchase/sales assistant	1		
Office secretary/typist	1		
Skilled workers	6		
Semi-skilled workers	6		
Unskilled workers	6		
Total			
Perquisites, 15% of salaries			

(b) Minimum total investment required to establish the unit

(i) Minimum total fixed capital

Land and buildings

Machinery and equipment

Total

(ii) Minimum total working capital:

Raw materials

Utilities

Personnel

Contingencies

Total

Grand total

2. Sources of raw materials

Soft wood suitable for making matchstick is available in different species in Cameroon, Congo, China, Ivory Coast, Nigeria and in parts of East Africa. Some of the species are:

- Abura: *Mitrargyna macrophylla*
- Emien" *Alstonia spp* (*congoensis*, *boonei*, *gilleti*)
- Essesang: *Ricinopdendron Spp* (*heudelotti*, *africanum*, *vautanenii*).

This is by no means exhaustive list. There may be other species and it is advisable to consult local forestry development agencies and timber research organizations, FAO (Food and Agricultural Organization, Rome), Economic Commission for Africa (Forest Industries Advisory Group) Addis Ababa and UNIDO (United Nations Industrial Development Organization), Vienna.

Medium softwood suitable for making matchboxes (both outer and inner boxes) is available in many African countries.

Reference to the chemicals required for coating the end of matchsticks and the igniting side of the matchbox has been made in paragraph 1.

The other materials including wrapping paper and glue may be obtained from local trade sources.

The Ministry of Industry in respective countries may also be approached for information on the sources of supply of various materials.

3. Sources of machinery and equipment and addresses of suppliers

Depending on investment capacity and degree of mechanization required, the complete set of safety matches making machinery or individual items of machinery may be ordered from the sources indicated below. The use of the machinery may involve the use of electric power. In rural areas in the absence of electricity, hand-operated machines may be ordered for use. While placing orders for machinery, it is advisable to specify the conditions under which the machinery would be used (that is, with or without power).

Czechoslovakia

Czechoslovak Chamber of Commerce and Industry
Argentinska 38, 170 05 Prague 7

Federal Republic of Germany

Aktiengesellschaft A. Hering, Postfach 220, 8500 Nurnberg 1

A. Roller GmbH and Co. Maschinenfabrik, Lengenderstrasse
29, 1000 Berlin 51.

German Democratic Republic

Chamber of Foreign Trade of the GDR
Schadowstrasse 1, DDR - 1080 Berlin

India

- (i) Kaka Iron Foundry, Tiruttangal, Sivakasi, Tamil, Nadu
- (ii) Shanmugham Engineering and Trading Co.
Feroke, Calicut, Kerala State
- (iii) Southern Match Traders, 8/10 Abdul Rahim Road, Race
Course, Coimbatore 641018
- (iv) National Small Industries Corporation
Near Okhla Industrial Estate, New Delhi 110020

Japan

Japan Consulting Institute
1-1 Yuraku-Cho, Chiyoda-ku, Tokyo

Korea

Korea Society for the Advancement of Machine
Industry (KOSAMI)
1-643 Yeoeuido-Dong, Yengdeungpo, Gju, Seoul

Sweden

Arenco AB, Jonkoping

Switzerland

Swiss Office for the Development of Trade

H.3 WAX CANDLES

Candles are an item of necessity in households. Particularly in rural households, they constitute a source of illumination. They are made from paraffin wax which is a product of petroleum refineries.

The candle manufacture is ideal for promoting as a women's enterprise, or even as an artisanal activity. Production can be manual or mechanical according to the demand and investment capacity.

This project profile relates to a production capacity of 96,000 candles per month based on an output of 200 candles per moulding machine per hour and the use of two machines. Each moulding machine will have provision for 100 moulds on twice an hour operation.

(a) Raw material requirements (per month)

- Paraffin wax - Stearic acid (commercial) - Wick rolls
- Colouring dyes (optional) - fuel (firewood or agricultural/cattle wastes) - Packing materials

(b) Utilities (per month)

- Power-water

(c) Contingencies (per month)

- Stationery - consumable stores

(d) Fixed capital

(i) land and buildings

- land 40 square metres
- building 25 square metres

(ii) Machinery and equipment

- Open low temperature furnace (brick work construction) based on firewood or agricultural/cattle wastes as fuel
- Metal vessels for melting wax (made of mild steel or aluminium)
- Moulding machine consisting of a series of metal moulds and cutter device
- Weighing balance
- Long-handle ladles, holding tongs, spatulas
- Office furniture and equipment

Minimum total fixed capital

(e) Process description

Paraffin wax is melted in a series of metal containers together with a small quantity of stearic acid in a low temperature open furnace. The melt may be coloured if so desired, by addition of suitable organic dyes (including vegetable dyes). The wax is maintained in a molten condition and is constantly stirred to keep it in a homogenous mass until it is transferred to the moulding machine.

The moulding operation consists of pouring the hot liquid mixture of wax, dye and stearic acid into the channel of the moulding machine which consists of a series of moulds which are shaped to the candle. The moulds contain a stretched length of cotton wick running through the length of the mould. The hot wax envelopes the wick and starts to solidify. The solidifying process is facilitated by keeping the outer space of the mould cooled under circulating cold water. When the candle has set firmly inside the mould, the mould is opened to release the candle. The candles are trimmed with a cutter, packed and marketed.

Since the temperature required for keeping the wax in molten condition is low, the furnace can be heated and cooled on a day to day basis.

(f) Personnel (skills and labour requirements)

Function	Number	Salary rate per month	Total
Manager	1		
Accountant cum storekeeper	1		
Purchase/sales assistant	1		
Office secretary/typist	1		
Semi-skilled workers	3		
Unskilled workers	6		
Total			
Perquisites, 15% of salaries			
Total			

(g) Minimum total investment required to establish the units

(i) Minimum total fixed capital (US\$)

Land and building
Machinery and equipment
Total

(ii) Minimum total working capital

- Raw materials
- Utilities
- Personnel
- Contingencies

Total

Grand total

Say

2. Sources of raw materials

Paraffin wax may be obtained from petroleum refineries or commercial sources which distribute petroleum products. Stearic acid (commercial grade) may also be obtained from commercial sources trading in chemicals or soap factories. Cotton wicks may be got prepared for women's cooperatives in the rural sector or any small scale unit concerned with spinning. Dyes may be purchased from trade channels.

3. Sources of machinery and equipment and other contacts for suppliers

Federal Republic of Germany

- (i) Hans Kurschner GmbH and Co kg. Spezialmaschinenfabrik 405
Nettetal 2 Rhineland, Postfach 2220
- (ii) Maschinen and Apparatebau Ing. Alfred Herrhammer kg 8703
Oschenfurt (main), Tucklehau ser strasse 47
- (iii) Arthur Wessbach kg Maschinenfabrik 6400, Fulda Postfach 1125

German Democratic Republic

Chamber of Foreign Trade of the GDR, DDR-1080, Berlin
Schadowstrasse 1

Hungary

Hungarian Chamber of Commerce P.O. Box 106
H-1389 Budapest

India

Oriental Machinery Pvt. Ltd.
25 N. Mukherjee Road
Calcutta 1

Kolhapur Candle Works
1435 Lakshmipuri Kolhapur

National Small Industries Corporation
Near Industrial Estate
Okhla, New Delhi 1100200

Japan

Japan Consulting Institute
1-1 Yuraku-Cho
Chiyoda-Ku, Tokyo

It is also possible depending upon the availability of engineering fabrication facilities within country to design and produce simpler types of candle moulding machine as well as the wax melting oven.

H4. KEROSENE STOVE

Hand-operated non-pressure type stoves which use kerosene as fuel are an item of daily domestic need in rural and urban households for cooking purposes. The increasing availability of kerosene to households as part of governmental social programmes of distribution of essential civil supplies to the Community and the difficulties in obtaining firewood (which has been the conventional low-cost domestic fuel) are providing a good base of demand for Kerosene Stoves to justify local production of the stoves.

This project profile relates to a production capacity of 500 pieces per month.

(a) Raw material requirements

Minimum expenses. The main raw materials are plain sheet steel in thin (28 swg) and thick (24 swg) sections, metal screws and nuts, wicks and paint.

Utilities (per month)

- Power
- Water

(c) Contingencies (per month)

- Postage and stationery
- Consumable stores
- Miscellaneous items

(d) Fixed capital

(i) Land and buildings

Land 400 square metres
Building 250 square metres

(ii) Machinery and equipment:

- Sheet cutting machine
- Sheet rolling machine
- Sheet bending machine
- Sheet perforation machine
- Threading machine
- Sheet seaming and welding machine
- Stamping machine
- Sand-blasting machine

- Stove enamelling machine
- Electric motors and accessories
- Office equipment and furniture

(e) Process description

The process involves the fabrication of the individual parts and assembling them into a composite unit consisting basically of three parts, namely the bottom container for kerosene, the middle part which is the combustion unit and the top part which is the base for seating the cooking vessel.

The steel sheets are cut and shaped according to the required design of the individual parts and screwed or welded together.

Each of the three main parts of the stove is designed to be screwed together at base with the part immediately next to it. The parts can be easily dismantled by unscrewing for periodic cleaning or adjustment/replacement of wick.

The bottom container has also an orifice with a screw lid for feeding Kerosene. The combustion unit has a perforated cylindrical steel sheet wrapping which serves as an inlet-air control and funnels the heat upwards to the cooking vessel and helps to minimize heat-losses due to radiation. The movement of the wick and the size of the flame are adjusted by means of a screw arrangement at the base of combustion unit. A tripod made of steel is welded to the top unit for seating the cooking vessel.

The entire assembly may be given a spray coating of stove enamelling to make it rust-proof and easy to clean.

(f) Personnel (skilled and labour requirements)

Funtion	Number	Salary rate per month	Total
Manager	1		
Accountant cum storekeeper	1		
Purchase/sales assistant	1		
Office secretary/typist	1		
Skilled workers	6		
Semi-skilled workers	10		
Unskilled workers	6		

Total

Perquisites, 15% of salary.

Total

(g) Minimum total investment required to establish the unit

(i) Minimum total fixed capital

- Land and building
- machinery and equipment

Total

(ii) Minimum total working capital

- Raw materials
- Utilities
- Personnel
- Contingencies

Total

Grand total

2. Sources of raw materials

Steel sheets, screws and nuts and wicks may be obtained from factories producing these materials or from trade sources and hardware shops. For information on suppliers, the Ministry of Industry and the Chamber of Commerce and Industry may also be contacted.

3. Sources of machinery and equipment and addresses of suppliers

The machinery used in the fabrication of stoves are of general purpose type common to many sheet metal processing industries and generally no single plant manufacturers and supplies all the machinery. The machinery may have to be purchased from different sources. It is therefore advisable to contact associations of industry, chambers of commerce, consular representatives, etc., specifying the type of machinery required and the purpose for which it is proposed to be used and requesting them to help with the addresses of suppliers.

The contact organizations in some of the countries are listed below. In the case of countries not listed, the respective embassies may be approached for assistance;

Czechoslovakia

Czechoslovak Chamber of Commerce and Industry, Argentinska 38 170 05 Prague 7

Federal Republic of Germany

Association of German Machinery Manufacturers (VDMA) D-6000
Frankfurt/Main 71

German Democratic Republic

Chamber of Foreign Trade of the GDR Schadowstrasse 1
DDR-1080 Berlin

India

National Small Industries Corporation, Near Okhla Industrial
Estate, New Delhi 11020

Federation of Indian Export Organizations Allahabad Bank
Building, 17 Parliament Street New Delhi 110001

Japan

Japan Consulting Institute 1-1 Yuraku-Cho,
Chiyoda-Ku, Tokyo

Korea

Korea Society for the Advancement of Machine Industry
(KOSAMI) Yeoeuido-Dong, Yeongdeongpo, Seoul

Sweden

Swedish Export Council
P.O. Box 5513
S-11485, Stockholm

Switzerland

Swiss Office for the Development of Trade
Dept. 4, P.O. Box CH-8035 Zurich

H5. STOVE WICKS

Stove wicks are important items used in domestic stoves. A wick itself is also used in paraffin lamp. Being a large consumable item, there is a good scope for manufacturing of paraffin lamp wicks and stove wicks in the rural areas. Apart from the large requirement of rural areas, there is also an important demand of this item in the modernized African cities. The technology involved in this type of manufacturing unit is quite simple.

This project profile relates to a production capacity of 30,000 pieces per month.

(a) Raw material requirements per month

- (i) Cotton/staple yarn about 1,500 kg
- (ii) Low quality cotton about 750 kg
- (iii) Polythelene bags, labels etc..

(b) Utilities per month

(c) Other contingencies per month

(d) Fixed capital

- (i) Land and building

This unit does not require much space. Two rooms of good size are sufficient for the installation of the machinery and equipment.

(ii) Machinery and equipment.....

- Braiding machines:
- 24 spindles with electric motor
- Windking machine
- Tables, scissors
- Office furniture

(e) Process description

Cotton staple yarn should be placed on braiding machines. Long dories along with cotton filling are braided. These long dories are cut into pieces of 15" and 10". Such pieces are packed in a polythelene packets and are ready for marketing.

(f) Personnel (skills and labour requirements)

Category	Number	Salary rate per month	Total
Manager (owner)	1		
Accountant/cashier	1		
Braiding machine operators	2		
Winding machine operator	1		
Mix-work/packer	2		

Total:

Perquisites (15 percent
of salaries)

Total:

(g) Minimum total capital investments required to establish the unit

(i) Minimum total fixed capital

(ii) Minimum total working capital

- Raw materials
- Utilities
- Other contingencies
- Personnel

Minimum grand total capital investment requirement

2. Sources of raw materials

The raw materials are available locally

3. Sources of machinery and equipment and addresses of suppliers

When making enquiries it is advisable to specify whether complete machinery and equipment or only some items of equipment are required.

India

- (i) Sidana Engineering Works, New Industrial Town, Fariadabad
- (ii) Mohindra and Co. Cheekanta Road, Pittalia Bamba
Ahmedabad-1
- (iii) Strichand Engineering and Moulding Co. E. Ward
Kuber, Nagar, Ahmedabad
- (iv) Bhupinder and Brothers, Outside Daryapur Gate
Swaminarain, Godown, Ahmedabad 3800a.

Japan

Moritani and Co. Ltd, International Trade and
Engineering 4-22

QUESTIONNAIRE ON SMALL-SCALE INDUSTRY ESTABLISHMENTS
(related to leather, textile, food, wood, metal work and engineering units)
(use different sheet for each product)

I. General information

1. Name of the product produced _____
2. Type of machine or equipment used - source price per unit _____
3. Capacity of machine or equipment (hrs/day/month) _____
4. Total annual production (1984 or 1985) (tons/litres(m²)) _____
5. Number of production units (set of machines or equipment)* _____
6. Procurement of equipment; raw materials and supplies done by
 - (a) self
 - (b) central procurement body (government)
 - (c) co-operative
 - (d) subsidized by government
7. Marketing of products done by
 - (a) Self
 - (b) Central sales body (government)
 - (c) Co-operatives
8. Repair and maintenance done by
 - (a) Self
 - (b) Central shop (government)
 - (c) Co-operative shop
9. Assistance provided by government in
 - (a) preparation of studies
 - (b) credit at low interest
 - (c) Subsidized
 - (d) training
 - (e) tax exemption
 - (f) R & D
 - (g) advice and support in improving operation of production
 - (h) advertizing
 - (i) land provided by government

II. Specific information

1. Name of plant (also of contracting company, if any) _____
2. Location/Address of Industrial Estates or central promotional organization (if any): _____
3. Year established _____
4. Total investment (US\$) _____
5. Total covered area of plant (M²) _____
6. Indigenous ownership (%) _____
7. Total labour force; _____
of which skilled technical staff; _____

* With reference to machine or equipment required for the complete conversion process from raw material to the required product.

8. Raw materials

Raw materials (specify if raw, semi-finished, finished or waste)	tons/litres etc.	Local/imported	Supplying country	Cost per unit
(a)				
(b)				
(c)				
(d)				

9. Utility requirements per year (a) water (m³)
 (b) electricity (kwhr)
 (c) other fuels specify (tons/litres/etc.) _____

10. Capacity of production and sales

Products items	Type of machine or equipment	Annual capacity (tons/litres/m ²)	1984 or 1985 production (tons/litres/m ²)	1984 or 1985 ex-factory sales (value in US\$)	Unit price (US\$ value)
(a)					
(b)					
(c)					
(d)					
Total					

11. Plans for expansion and diversification

Product	Expansion Additional annual capacity (tons/litres/m ²)	Year of operation	New products annual capacity (tons litres/m ²)	Year of operation
(a)				
(b)				
(c)				
(d)				

12. Brief description of process and technology of existing plant (including mention of major machinery and equipment and their suppliers).

List of Published Materials Consulted

1. A Guideline manual for small-scale engineering industries, metal working and light engineering sector, by Aloke Mitra, Valetta, Malta, 1974.
2. An Investment Guide 1980 by Kenya Industrial Survey and Promotion Centre.
3. Appropriate Industrial Technology for Sugar, Monographs on Appropriate Technology, No. 7.
4. Asian Network for Industrial Technology Information and Extension by "Technonet Asia," Singapore.
5. Chemical Engineering Series, The Chemical Process Industries R. Norris Shreve, Second Edition.
6. Clothing industrie in the Central African Subregion, E/CN.14/INR/166, ECA Addis Ababa, 1968.
7. Development and Transfer of Technology Series, Technology from Developing Countries, No. 7, UNIDO, Vienna, 1980.
8. Development of small scale industry in Africa, E/CN.14/AS/III/25, ECA Addis Ababa, 1966.
9. Economics, February 1966, XXXIII, "Growth, Sales and Profit Maximization," by J.K. Williamson.
10. Economic Geograph of Industrial Materials, Reinhold Publishing Corporation, 1956.
11. Feasibility Study Report on liquid sodium silicate - Sudhansu S. Padit, UNIDO Small-Scale Industry Adviser, 1972.
12. FAO Portfolio of Small-Scale wood-based Panel Plants by Bison, Bahre and, Greton, Rome
13. Guidebook for Rural Cottage and Small and Medium-Scale Industries. Paddy Rice Cultivation (seventh edition). Published by "CECOCO" Exhibition Demonstration Centre Japan, 1965.
14. Guidelines for the establishment of Industrial Estates in Developing Countries by UNIDO, Vienna, New York, 1978.
15. How to Establish Industries by Moritani and Co., Ltd., International Trade and Engineering, Tokyo.
16. How to Start Manufacturing Industries, Technological and Industries Perspectives - UNIDO, Vienna, 1981.

17. Howard Business Review - "Small Manufacturing Enterprises," by W. Arnold Hosmer, November-December, 1957.
18. Industrial Plant Guide by the Yokohama Industrial Institute and Trade Centre, Yokohama, Japan.
- ~~19. Industry in Africa, A.F. Ewing Oxford University Press, 1968.~~
20. Inventory of Adapted Technologies for ACP countries. Centre for Industrial Development, Bruxelles, 1979.
21. Investment of Africa, December 198 , ECA, UNIDO.
22. Journal of American Statistical Association: "The Variability of Profitability with size of Firms, 1947-1958," December 1964.
23. Kirk Othmer, Encyclopedia of Chemicals Technology, Second Edition, 1964, Volume 3, Page 54.
24. Leather Goods, Metal and Engineering Products, and Textiles by Constantin Hang GmbH Co., West Germany.
25. Liste des Institutions s'occupant de la Technologie alimentaire - S/CARF/OIT/CRAT/DT/01, 1981.
26. Monographies de l'ONUDI sur le Developpement Industriel No.11 - La petite industrie, Nations Unies, New York, 1969.
27. Monographs on appropriate industrial technology No.3. Appropriate industrial technology for paper products and small pulp mills, United Nations, New York, 1979.
28. Nations Unies, Rapport de la Conference asiatique sur l' industrialisation, Manille, Philippines, 1965, New York, 1966, ID/CONF.1/R.R/2 et corr.1.
29. Nations Unies, Rapport du Colloque sur le developpement industriel en Afrique, Le Caire, 1966, New York, 1966, ID/CONF.1/R.R./1 et corr.1.
30. Natural Pesticides from neem tree (Azadirachta Indica A. Juss), First International Conference on neem.
31. Official Export Register of the Federation of Germany Industries and the Federation of German Handicraft Organization, 14th Edition, published by Gemeinschaftsverlag GmbH, West Germany.
32. Plan de promotion et de developpement de l'Artisanat Traditionnel Malgache par le service de l'artisanat de l'Industrie et des Mines.
33. Project de rapport au gouvernement de la République Démocratique de Madagascar sur la promotion et de développement des petites et moyennes entreprises par le PNUD BIT.

34. Project profiles on reserved items, Vol. I, II, III, Development Commissioner, Small Scale Industries, India.
35. Séminaire sur le développement de l'artisanat et des petites industries pour les femmes de pays francophones, TRCW/SDD/TW/80/02, Addis Ababa, 1980.
36. Small and Medium-Sawmills in Developing Countries, FAO, Rome, 1981.
37. Small-Scale Industries in Africa, Addis Ababa, January 1969.
38. Small Scale Industry in Latin America - United Nations Development Organization, Vienna, United Nations, New York, 1969.
39. Statistical Yearbook 1979/80, Department of International Economic and Social Affairs, United Nations, New York, 1981.
40. Strategy of Economic Development, Albert O. Hirishman, 1959, Yale University Press, Inc.
41. System Approach to Appropriate Technology Transfer, J.F. Rada, International Management Institute, Geneva, Switzerland.
42. Technology and Economic Aspects of Establishing Textile Industries in Developing Countries, UNIDO, Vienna, 1967.
43. Textile Industries in Africa, E/CN.14/AS/III/24.
44. The Effectiveness of Industrial Estates in Developing Countries, United Nations Industrial Development Organization, Vienna, 1978.
45. The Efficacy of Industrial Estates, in India, by N. Somasekhara, Delhi, Vikas, 1975.
46. The Industrial Estate - Tool for industrialization by W. Bredo - Stanford Research Institute, 1960.
47. The Textile Situation in Central Africa: Markets-Industries Prospects E/CN.14/INR/166, ECA, Addis Ababa, 1969.
48. The Textile Situation in West Africa: Markets-Industries Prospects E/CN.14.INR/129, ECA, Addis Ababa, 1969.
49. The Vanishing Harvest - A study of food and its conservation, R.K. Rabinson, Oxford University Press, 1983, Page 204.
50. Traditional Palm-oil Processing by Women and Introduction of New Technologies, Ivory Coast, Cameroon and Sierra Leone 1981.
51. USM International Shoe Machinery by the British United Shoe Machinery Company Ltd., England.
52. Wool Handbook, Werner Von Bergen, Inter-Science Publishers, 1939.
53. Year book of Industrial Statistics 1974 Edition, Department of International Economic and Social Affairs, United Nations New York, 1976.