

## CERTIFICATION

I certify that this project title feasibility studies on Polypropylene bag plant was carried out by MUHAMMAD D. ALKALI under the supervision of Dr. J. O. ODIGURE in department of Chemical Engineering, Federal University of Technology, Minna.

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Signature of Supervisor

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Date

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Date

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External Examiner

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Date

## ACKNOWLEDGEMENT

Please be to ALLAH the controller of the universe, who spared my life and gave me the knowledge and ability to come all this through.

I would like to register my profound gratitude to DR. J. O. ODIGURE, H.O.D. Chemical Engineering Department and my project supervisor for his simplicity, encouragement and guidance throughout the study. There is nothing to say than thank you for your unrelent efforts.

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## CHAPTER ONE

### 1.0 INTRODUCTION

The need for increased number of chemical industries in this country can not be over emphasized. This is in direct relation to the ever increasing population of our people. With the country's fast drift towards capitalism and the inherent growth in privatization and commercialization of industries there has been sudden demand in number of industries. This is because of the increased and improved communication network of the country. More roads has been constructed and more communities and towns linked to the cities.

Packaging is inevitable in the transfer of goods and materials from one place to another. Plastic sheet, papers, cloth, jute, hemp, sisal and leather are transformed long ago into bags/sacks. Due to high cost of cloth and leather other important uses are now attached to them. Their use is presently restricted to special or low volume utilization for packaging. Paper, hemp, jute and polypropylene (pp) bags share the same advantages of low cost of raw materials and availability. Chemical(s), water, sharp objects etc can not be packaged with paper due to its low physical property and frequent failure.

Polypropylene has certain technical advantages over other synthetics as well as natural fibres that are used for the purpose of packaging. These include high strength-to-weight-ratio, good abrasion resistance, chemical resistance, good thermal bonding properties, soft handle, good soil released, low density, low water absorbency, resistance to micro-organism, low cost, availability and high coefficient of fabric for better cloth stability and stacking properties.

Polypropylene can be made available in abundance and their prices are very stable. Because polypropylene originates from



stable electricity supply, constant water supply, free of traffic conjunction and has good communication system.

All these will facilitate quick, smooth and cheap transportation of raw materials and spare parts as well as manufacture and distribution of finished products. More over, waste and effluent disposal will be comparatively cheaper and easier than some locations in the country.

## 1.6 PLANT SIZE AND CAPACITY

The plant will be situated on a 40,000m<sup>2</sup> area to be acquired prior to erection of building and other infrastructure.

The plant will have a rated installed capacity to convert 5760kg of polypropylene per day (2102.4 tones/year).

### Choice of Technology:

The machines and equipment to be used is as shown in Appendix I. the criterion for the choice of the machines/equipment include:

- Simplicity in design
- Flexibility in style
- Ease of operation and maintenance
- Low cost
- High productivity and efficiency
- Durability and ruggedness

## 1.7 SOURCING OF RAW MATERIALS

The major raw materials include stabilizers, dyes pigments, polypropylene chips, fixers and thickness (to be supplied by Elemepetro-chemical Co. and KRPC/NNPC LTD). Plied sawing yarns will be supplied by Kaduna textile PLC and United Nigerian Textile Kaduna.

- 2.6.3 Electrical: Electrical equipment, electrical power control and distribution, maintenance and electrical spare parts replacement in the entire factory as well as operation and maintenance of standby power plant will be the duties of this department. It will also be involve in monitoring, planning and ordering of its stock. This department will consist of electrical engineers, maintenance electrician ad store keeper.
- 2.6.4 Civil Works: The function of this department include monitoring and maintenance of buildings, access ways, service trenches water supply associated pipe, values, tank and vacuum services. It will also be involve in monitoring and ordering of its stock. The department include engineers, builders and plumbers.
- 2.6.5 Production Department: This is concerned with actual manufacturing by employing machines ad skills to convert the raw material into finished products as well as quality control and inspection to maintain standard of specifications. With the exception of production manage, clerks and quality control staff others operate on 3 shifts.
- 2.6.6 Personnel Department: This administrative wing of the enterprises is concerned with co-ordination of staff records and monitoring job analysing and evaluation. Recruitment, training, security as well as safety and welfare is also taken care by this department. In this category, only the time keepers security men, nurses and other attendants work on shift.
- 2.6.7 Commercial Department: This department is responsible for the procurement and supply of raw materials, spare part as well as marketing research, sales and distribution of the finished products. This unit comprises of two arms (procurement and purchases/stores and marketing section). The employees in this department are on permanent morning.

### **3.17 MAINTENANCE**

3% of the fixed capital investment will be assigned for maintenance and repairs.

### **3.18 RESEARCH DEVELOPMENT**

For research development, 6% of every sales will be set aside.

### **3.19 CAPITAL ALLOWANCE**

Qualifying building expenditure rates 15%/10%

Qualifying furniture and fittings 5%/10%

Qualifying plant expenditure 20%/13%

These above are the percentage set aside for initial/annual allowance.

### **3.20 UTILITIES AND ACCOMMODATION**

For utilities, 10% of total product cost will be retained while 20% of cost of building which include administrative and machinery building will be retained.



## CHAPTER FOUR

### 4.0 INVESTMENT COST

#### 4.10 FIXED ASSETS

The fixed assets are estimated as represented in Appendix II. This include land, building, vehicles, office equipment, machinery and equipment etc. the total cost of fixed asset is estimated to be 392.2 million naira.

#### 4.11 INITIAL WORKING CAPITAL

The initial working capital is expected to cover interviews, running and maintenance of vehicles and operating expenses for administration. The initial working capital is estimated to be 44.3 million naira.

#### 4.12 OTHER INVESTMENT COSTS.

- Commissioning Cost: It is expected that the company will cater for the expert who would supervise the installation of the plant. Since only two of them are recommended for this purpose, a maximum of N300,000 should cover their board and lodging during their envisaged two months of stay.
- Interest on Loan during Construction: The construction time will be nine months. The ordering of the equipment will take place during the first month. Therefore, all the required loan will be taken at the beginning of the project. Thus the servicing of the loan should begin immediately.
- Contingency: 5 percent of the total investment is allowed for contingency.

#### 4.20 PROJECT FINANCING

#### 4.21 SHARE CAPITAL AND LOAN COMPONENT

The sponsors of this project are expected to provide a capital of N255 million naira. The rest of the capital is raised through loan. That is

# TITLE PAGE

FEASIBILITY STUDIES ON POLYPROPYLENE BAG PLANT.

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## ABSTRACT

A feasibility of setting-up a polypropylene bag plant to produce three varieties of packaging containers was carried out with the initial capital of N541.8 million. The Quattro bag variety selling at N120 per unit laminated sack at N40 per unit and ordinary sacks at N25 per unit a total sale revenue of N4.1209 billion will be realised at the end of first five year. A profit less all interest charges and profit after taxation of N1.66 billion were recorded over a period of five years.

Modern discounting techniques shows that the project is feasible even at an annual discount factor of 25%. This checklist may be employed to assess the overall viability of the project to enable interested funding institutions, government and management to determine whether they are prepared to support it or not.

Polypropylene can be made available in abundance and their prices are very stable. Because polypropylene originates from synthetic processing jute and hemp are unfortunately agricultural products whose production is not as plentiful as polypropylene.

With the advantages polypropylene bags have over others, it is unfortunate that the production has not been able to meet local demands in this country.

### **1.1 PROPERTIES OF POLYPROPYLENE**

Polypropylene (pp) like PVC has excellent properties but stress crack resistance and impact strength must be improved to enhance greater applicability. To improve impact strength, rubbery ethylene - propylene copolymers are added.

Modifying polymers for polypropylene include high ad low-density polypropylene, oxidized poly-ethylene, polyisobutylene and silicone.

Polypropylene sutures have high tensile strength, excellent strength retention and tissue reactivity but have poorer handling characteristics than nylon. Polypropylene has low density, high coefficient of fabric and resistance to micro-organisms. It vaporizes easily and does not form isomers.

### **1.2 USES OF POLYPROPYLENE BAGS**

Polypropylene bags are used for packaging purposes. They serve as suitable containers for the convenient dispersing, distribution, transportation and storage of goods such as Agro-products, foodstuffs, chemicals and other materials either in powder form grains, grains or chips.

### **1.3 AIM AND OBJECTIVES**

This studies (feasibility studies) is to serve as a guide for use by prospecting entire prenuers business men, companies,

are prepared to support it or not. The detailed project appraisal checklist can be completed to enable full evaluation to be made by all interested parties, where sufficient interest has been generated to explore the proposal in greater depth.

#### 1.4 MARKET SURVEY AND PATTERN OF CONSUMPTION

There is a minimum number of plants presently engaged in sacks production of which some are functioning adequately and are classified among the best chemical industry in Nigeria e.g Bago Super Sack Company in Kano and Lagos. This shows that the business is lucrative since their production is high and yet do not meet local demands. National fertilizer company of Nigeria (NAFCON) have to set up its own PP sack production line in order to meet its requirements. Some cement companies have followed suit. Evidence have shown that all the sack manufacturing plants have not produced up to 25% of the quantity demanded locally, therefore 80% of the market is yet to be filled up. If the quantity demanded locally can be met, then is a need for exportation to nearby African Countries. This suggest very generous market outlets for the products, the increasing population of our people agricultural produce, manufacturing products as well as business activities will cause an increase in the global demand of packaging materials and standards of bagging requirements.

If not all nearly all the sectors registered by Manufacturing Association of Nigeria (MAN) would require PP sacks for packaging of their raw materials, semi finished and finished products.

These include:

(i). Pharmaceutical and Chemical Sector: Raw Materials for production purposes are mainly packaged in PP sacks. These include fertilizer, paints, vanish, soaps, detergents, painting ink,



toiletries and cosmetics, and of course the basic chemical group like fillers, solid additives, resins, stabilizer, anticracking agent and so on.

PP sacks are also used in packaging of pharmaceutical raw materials and finished products.

(ii). Food Beverage and Tobacco Sector: In this sector PP sacks are used to package grains (rice, sorghum, maize, guinea corn, wheat et) pulses (cowpeas, groundnuts, soyabeans etc), finished and semi finished products e.g. flour (corn, cassava, whet) sugar and other products such as dried leave, oil seed cakes, animal feeds etc.

(iii). Non-Metallic Industries: The uses of PP sacks here is for both raw materials as in the conveyance of aggregate minerals, marble, quartz etc and its finished products like calcium, carbonate, talc, barrettes, mice, feldspars, flourspar, etc. a major consumer is the cement industry.

(iv). Other Manufacturing sector: This covers materials for domestic and industrial plastics, basic metals, iron and steel, pulp and paper, textile wearing apparel and leather and wood products. Other uses includes packaging of some products or ore of the group like tin and columbite, pulp and in packaging of flux, salts, dyes, resins, etc and travelling bags.

## 1.5 PLANT LOCATION

The plant is proposed to be located at Chanchaga Industrial Layout, Minna, Niger State, Nigeria due to its proximity to Abuja, the Nations fast growing Capital.

Minna, Niger State Capital is underdeveloped in terms of industrialization but not left behind in terms of commercial and business activities. When completed this project will increase the revenue base of the State and serve as source of employment to the people residing in it. The State Capital has good road network,

## CHAPTER TWO

### 2.0 LITERATURE REVIEW

#### 2.1 PRODUCTION TECHNOLOGY

Antioxidants and stabilizers are fed into a mixer with PP granules, chip or powder. Dyes or pigments is added when needed and mixed thoroughly. The mixture is channeled into a melting grid where it is heated to temperature of 250°C so as to obtain a melt flow index (MFI) between 1 - 10 (depending on the expected characteristics of the extrudate).

To remove impurities from the melt, it is passed through a filter and metered in the proportion as a film through the die of the extruder. The film is immediately quenched in the cooling water bath kept at between 50 - 60 °C. The sharp edge of a knife which extend across the machine width is used for slitting, the final width of the tape are variable because the pitch of the blades are adjustable.

The temperature and viscosity of the initial melt filtered are critical and must remain constant throughout.

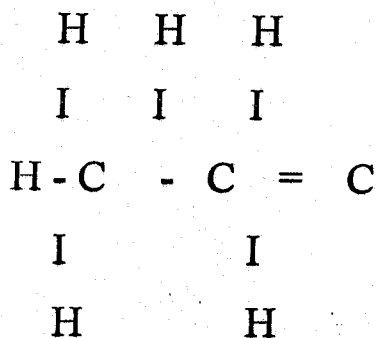
In a heating chamber, the slit tape of PP are drawn to a ratio of about 8 subsequently (this depends on the characteristics of the tapes and the dimension required) slit tapes of 1 - 3mm width and 100 - 3090 cm thickness are the most common.

Each filament is wound onto bobbins. Some of these are rewound onto welf-bobbins while the rest are mounted on creels to supply circular looms directly.

The tapes are then woven into circular fabrics and wound onto cylindrical power driven cores which will finally feed the laminated machines. The laminated fabrics will be used for bags which are not to allow moisture or free breathing e.g. packaging of chemicals, cement and pharmaceuticals.

Finally, fabrics are cut shaped, fused and sawn into size, printed upon with a logo.

## 2.0 POLYPROPYLENE STRUCTURE



Formula	$\text{CH}_3\text{CH}=\text{CH}_2$
Molecular Weight	42.08
Critical Pressure	46kg 1cm <sup>2</sup>
Critical Temperature	91.7°c
Boiling Point	-47°c
Melting Point	-185.2°c
Flash Point	188°c

Liquid density at storage temperature and pressure 530kg 1cm.

Flammability limit in air : Upper limit 11 vol. %

Lower limit 2 vol. %

## 2.1 PLAN OF PRODUCTION

Two extruding machines are rated to extrude 80kg of polymer/hr each. The third extruder produced 7,008 x 10<sup>5</sup>kg worth of plain film/yr, 3 production will be schedule as follows:

7.00 am - 3.00 pm (7.00 hrs - 15 hrs) morning shift

3.00 pm - 11.00 pm (15.00 hrs - 23.00 hrs) afternoon shift

11.00 pm - 7.00 am (23.00 hrs - 07.00 hrs) Night shift

For 8 hours shift, the 2 extruding machine will produce (80 x 2

x 8 kg) = 280kg worth of 1000 tones slit tapes which equal to 3840kg/day.

This amount to a total of  $5760 \times 365 = 2.102 \times 10^3$  tonnes. 24 circular looms can weave  $0.8 \times 2 \times 70 \times 24 \times 8 = 21504 \text{ m}^2/\text{year}$  of fabric/shift and  $64512\text{m}^2/\text{day}$  and  $23,546,880\text{m}^2/\text{year}$ .

Two jumbo size circular looms can produce  $1.40 \times 2 \times 50 \times 2 \times 8 \times 3 = 6720\text{m}^2/\text{day}$  and  $2.453 \times 10\text{m}^2/\text{year}$  giving a total woven polypropylene slit film capacity of  $25,999,680\text{m}^2/\text{year}$ .

The slit tapes to be used for "quattro" construction are different from those from sacks. However, the total production consist of 33.33% Quattro bags, 33.33% sacks and 33.33% plain film.

## 2.2 PRODUCTION SCHEDULE

Since the company is a new one employing new machine and equipment as well as labour which may not be highly experienced in using these machines, it is practically impossible to achieve a hundred percent efficiency as well a ninety percent capacity utilization. It is customary not to operate new machine and equipment at the highest performance level in the first year, therefore it is proposed that production would be at 60% capacity in the first year, 75% in the second year and 90% utilization will commence in the third year.

The table below gives a summary of the planned schedule.

**TABLE 1**  
**PRODUCTION SCHEDULE FOR 5 YEARS.**

Installed Capacity	100% UNITS	60%	75%	90%	90%	90%
<b>Product Type:</b>						
Quattro Bag	3.5 x 10 <sup>6</sup> kg					
	7.0 x 10 <sup>5</sup> kg	2.1x10 <sup>7</sup> kg	2.7x10 <sup>6</sup> kg	3.3x10 <sup>6</sup>	3.3x10 <sup>6</sup>	3.3x10 <sup>6</sup>
Sacks	7.6 x 10 <sup>7</sup> kg	4.2x10 <sup>5</sup> kg	5.6x10 <sup>5</sup> kg	6.1x10 <sup>5</sup>	6.1x10 <sup>5</sup>	6.1x10 <sup>5</sup>
	7.0 x 10 <sup>5</sup> kg	8.8x10 <sup>7</sup> kg	1.2x10 <sup>7</sup> kg	1.3x10 <sup>7</sup>	1.3x10 <sup>7</sup>	1.3x10 <sup>7</sup>
Films	7.0 x 10 <sup>5</sup> kg	4.2x10 <sup>5</sup> kg	5.6x10 <sup>5</sup> kg	6.3x10 <sup>5</sup>	6.3x10 <sup>5</sup>	6.3x10 <sup>5</sup>
		4.2x10 <sup>5</sup> kg	5.6x10 <sup>5</sup> kg	6.3x10 <sup>5</sup>	6.3x10 <sup>5</sup>	6.3x10 <sup>5</sup>
Total Production:	2.1 x 10 <sup>6</sup> kg	1.3x10 <sup>6</sup>	1.7x10 <sup>6</sup>	1.9x10 <sup>6</sup>	1.9x10 <sup>6</sup>	1.9x10 <sup>6</sup>

### 2.3 MANPOWER/STAFF REQUIREMENT

Highly skilled professional graduate will form the management team in this manufacturing outfit which will be composed of a polymer specialist electrical and mechanical engineers, accountants and business administrators. All other workers would have required some form of training with experience in their respective discipline.

Appendix V give the breakdown of the staff required to run the company.

### 2.4 ROLES OF INDIVIDUAL SECTIONS (DEPARTMENT)

2.6.1 Engineering Services: This department will be headed by a chief engineer, preferably a polymer specialist.

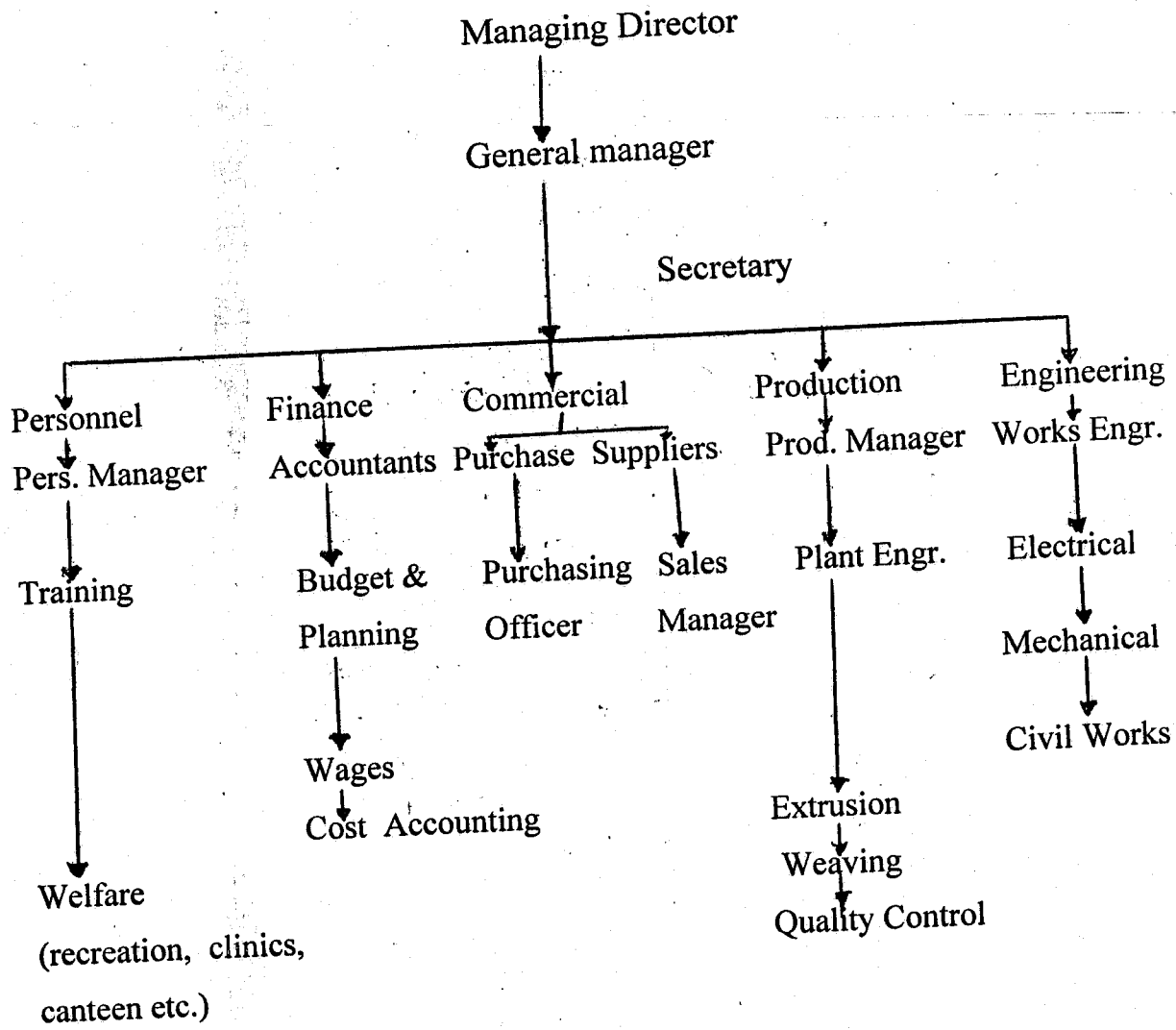
2.6.2 Mechanical: This sub-unit will take care of equipment, monitoring, maintenance, spare parts fabrication and replacement, compressed air generation and distribution, water as well as efficient treatment and disposal, fire protection equipment and facilities, heating, ventilation, humidity and air conditioning. In addition, they are also charged with maintenance of vehicles, internal transport, planning and ordering of spare parts stock. The unit will consist of a mechanical engineers, technicians and mechanics.



2.6.8 Finance Department: General financial management include Budget Planning and Control, financial statement, accounting, wage preparation and control. No shift in this department.

## 2.7 ORGANIZATIONAL CHART

The proposed organization chart is as shown in fig 1.



## DEDICATION

I dedicate this project to my beloved mother FATIMA ALKALI and my father MOH'D ALKALI. To my brothers and sisters my friends both at home and in school and above all the almighty ALLAH, the creator, the sustainer, the bestower of life and the bringer of death who gave me the health and wisdom to successfully pass through this project.

to say that the source of capital shall be assumed to be from equity holders, term loan and over draft.

The equity asset base is 47% of the global cost, the term loan shall be used to finance production, installation, instrumentation and piping. The over draft would cover vehicles, raw material operating labour and product inventory.

#### **4.22 DEBT SERVICE**

Loan will be repaid on an equal amount commencing from the month when production should have started. One year of grace will be obtained by the company to cover the construction and commissioning period. However, interest on loan will be serviced during this period at 13% p.a. Repayment of the principal sum will be spread over the lifespan of the project which is ten years.

Appendix III gives the repayment schedule of the company based on these plans.

#### **4.30 OPERATING COST**

##### **4.31 RAW MATERIAL COST**

The raw materials for polypropylene bag production are fixed and are estimated to be N6.553 per kg of polypropylene chips, N62.23 per kg of sawing years, N650.5 per kg of printing dye/pigments and N108.5 per kg of printing auxiliaries.

The contingency per cost of raw material is estimated at 5% of the annual cost. The detail of the raw material cost is given in Appendix IV

##### **4.32 LABOUR COST**

The manpower requirement according to their categories is given in Appendix V. A mean salary is given to each category in order to compute the total cost of labour which amount to N24.3 million.

## CHAPTER THREE

### 3.0 BASIS OF FORECAST

#### 3.10 INSURANCE

In this studies 2% of fixed capital investment will cover all requirement machinery and buildings.

#### 3.11 TAXATION

In the calculation done 5% of fixed capital investment will be set aside for local tax while 20% of income has been set aside for federal tax.

#### 3.12 COMMISSION

2% of the sales will be for commission and promoters.

#### 3.13 DIVIDENDS

A maximum of 50% of profit after tax or 70% of the paid up capital would be distributed as dividends.

#### 3.14 MANUFACTURING OVER HEADS MAINTENANCE

Plant Overhead: For plant overhead cost 50% of cost for operating labour supervision and maintenance will be set aside.

General Expenses:

(i). Administrative Cost: From the calculation for administrative cost, 50% of cost for operating labour, supervision and maintenance will be set aside.

(ii). Advertised Cost: 5% of cost for operating labour, supervision and maintenance will also be set aside for advertising and promotion.

#### 3.15 LABORATORY CHARGES

From the calculation, 10% of operating labour will be for laboratory charges.

#### 3.16 OPERATING SUPPLIERS

10% of the cost for maintenance and repairs will be computed for operating suppliers.

### 4.33 OTHER FIXED OPERATING COST

These include the cost of advertisement, audit fees, administrative expenses insurance utilities etc. they have been estimated and included in the summary of operating cost given in the cash flow table 3.

### 4.40 PROFITABILITY ANALYSIS

#### 4.41 ASSUMPTION

For the purpose of analysis the profitability of the project, the following assumptions were made:-

- (i). The effect of inflation on both the income and the costs is of the same order of magnitude. Thus, the net effect on revenue and cost is zero when this assumption is inapplicable, the effect of varying rate, must be imposed on the figures.
- (ii). All prices and costs are based on January 2000.
- (iii). All the company's product will be sold.
- (iv). The utilization of 90% will be attained in the third year of production and it will maintained thereafter.

#### 4.42 OPERATING PROFIT

The order to determine the operating profit, the price level, annual sale revenue depreciation, interest on borrowed capital and taxes are required as additional information.

- Price Level: The current purchase price of PP products are N120 for each of Quattro bags, N40 for each of laminated sacks ad N25 for each of ordinary sacks.
- Annual Sales Revenue: Detail of annual sales revenue is represented in table 5 and projected for 5 years.
- Depreciation: Building equipment, vehicles and furniture do wear out at different rates. Different depreciation values were attached to them accordingly. Buildings were depreciated at 5%, office equipment at 10% machinery and equipment at 10% and vehicles at 2%.



- Interest on Borrowed Capital: An interest rate of 13% on the borrowed capital is assumed. From the repayment schedule presented in Appendix III, the average values of interest payable annually is N22.49 million.
- Taxes: It has been proposed that the company be a limited liability company with the three tiers of government subscribing for the share capital. A low tax rate of 25% is therefore considered appropriate.

#### 4.43 PAYBACK PERIOD

Payback period is the time it takes for cash flows to recoup the original fixed capital expenditure. It is the value of S which satisfied the equation below.

$$S = PBP$$

$$ACf = Cfc - S$$

$$S = 0$$

Where ACf = net annual cash flow

Cfc = fixed capital cost

S = scrap or salvage value

In the worst situation, the scrap value may be assumed zero, for this case, it can be said that the payback period is 2 years. Since the scrap value of the plant will not be zero then the payback period will be for 10 years.

#### 4.44 RETURN ON INVESTMENT AND EQUITY CAPITAL

The return on (total) investment (ROI) and on equity capital (ROE) are computed as follows:

$$\text{ROI} = \frac{\text{Net Operating Profit}}{\text{Total Investment}}$$

-----  
Total – Investment

And

$$\text{ROE} = \frac{\text{Net Operating Profit}}{\text{Total Investment}}$$

-----  
Total Investment

Detail of determination of return on investment performed nation is given in table 4.

#### **4.45 DISCOUNTED CASH FLOW RATE OF RETURN**

The discounted cash flow rate of return is the annual interest rate at which the returns on an investment must be discounted off to make its net present value equal to zero. It is equivalent to the maximum interest rate at which money could be borrowed to finance the project under conditions where the net cash flow to the project over its life would just sufficient to pay all principal and interest accumulation on the outstanding principal.

The discounted cash flow rate of return is variously referred to as the true rate of returns (TRR), interests investors and interest rate of returns (IRR). The value of the discounted cash flow rate of return as an index of profitability is that it takes account of the time value of money and the estimated life span of the project.

For this project, the value of the discounted cash flow is represented in table 3.

**TABLE 2**  
**PROFIT AND LOSS STATEMENT**

	YEAR 1 (N,000)	YEAR 2 (N,000)	YEAR 3 (N,000)	YEAR 4 (N,000)	YEAR 5 (N,000)
<b>A SALES:</b>					
Quattro Bags	328,409.4	360,053.8	420,460.0	431,225.0	437,200.0
Laminated Sacks	163,286.6	228,715.2	309,215.0	319,215.0	320,200.0
Ordinary Sacks	102,304.0	136,072.0	188,450.0	177,685.0	180,725.0
<b>SUB TOTAL</b>	<b>594,000.0</b>	<b>742,500.0</b>	<b>918,125.0</b>	<b>928,125.0</b>	<b>938,125.0</b>
<b>B OPERATING COST:</b>					
General Expenses	39,515.0	49,393.76	60,742.20	77,177.77	97,472.20
Labour	24,300.0	30,375.00	37,968.75	47,460.00	59,326.17
Raw Materials	10,500.0	11,020.00	11,158.00	11,216.00	11,276.00
Repair & Maintenance	4,450.0	5,562.50	6,953.25	8,691.40	10,864.25
Utilities	1,800.0	2,400.00	3,000.00	3,000.00	3,000.00
Other Services	25,094.0	31,367.50	39,209.38	49,011.61	61,264.65
Depreciation	28,190.0	21,142.50	15,856.88	11,892.66	8,919.45
<b>SUB TOTAL</b>	<b>105,209.0</b>	<b>130,200.76</b>	<b>159,031.43</b>	<b>196,557.73</b>	<b>252,203.27</b>
<b>C</b>					
Oper. Income (A - B)	488,791.00	612,299.24	759,093.57	731,567.27	685,921.73
Finance Charges	28,190.00	21,142.50	5,856.88	11,892.66	8,919.45
Income Before Tax	460,601.00	591,156.74	753,236.69	719,674.61	677,002.28
Taxation	10,544.24	41,877.62	180,776.81	172,721.91	162,480.55
Income After Tax	350,056.76	449,279.12	572,459.88	546,952.70	514,521.73
Annual Cash Income	378,246.76	470,421.62	578,316.76	558,845.36	523,441.18
Ordinary Dividends	175,028.38	224,639.56	286,229.94	273,476.36	257,260.89
Retained Earnings	203,218.38	245,782.06	292,086.82	285,369.01	266,180.32

**TABLE 3**  
**DETERMINATION OF DISCOUNTED CASH-FLOW, PRESENT-WORTH AND**  
**NET PRESENT-VALUE**

	0	1	2	3	4	5
1	Fixed Capital investment	392,200.00				
2	Working Capital	44,300.00				
3	Total Capital Invest. (1-2)	436,500.00				
4	Annual Income (sales)		594,000.00	742,500.00	918,125	928,125.00
5	Annual Manufact. Cost					
	i. Raw Material		10,500.00	11,020.00	11,158.00	11,216.00
	ii. Labour Cost		24,300.00	30,375.00	37,968.75	47,460.94
	iii. Utilities		1,800.00	2,400.00	3,000.00	3,000.00
	iv. Maint. & Repairs		4,450.00	5,562.50	6,953.25	8,691.40
	v. Operating Supplies		445.00	556.25	695.31	869.14
	vi. Laboratory Charges		2,430.00	3,037.50	3,796.88	4,746.00
	vii. Insurance		7,844.00	9,805.00	12,256.25	15,320.31
	viii. Plant over head		14,375.00	17,968.75	22,460.94	28,076.17
5-T	Total of line 5		65,694.00	80,807.00	98,289.23	119,379.96
6	Annual General Expenses					145,731.07
	i. Administration Expes.					
	ii. Advertisement		1,437.50	1,796.88	2,246.10	2,807.63
	iii. Research & develop.		1,437.50	1,796.88	2,246.10	2,807.63
	iv. Audit Fees		35,640.00	44,500.00	55,687.50	69,609.38
6-T	Total of line 6		1,000.00	1,250.00	1,562.50	1,953.25
7	Total Production Cost (5-T+6-T)		39,515.00	49,393.76	60,742.20	77,177.77
8	Annual Operating Income (4-7)		105,209.00	130,200.76	159,031.43	196,557.73
9	Annual Depreciation		488,791.00	612,299.24	759,093.57	731,567.27
10	Income before Tax (8-9)		28,190.00	21,142.50	15,856.88	11,892.66
11	Income After Tax 24% (0.76x10)		460,601.00	591,156.74	753,236.69	719,674.61
12	Annual Cash Income (9+11)		350,056.76	449,279.12	572,459.88	546,952.70
13	Annual Cash flow (3+12)		378,246.76	470,421.62	578,316.76	558,845.36
14	Discount factor for 25% interest		814,746.76	906,921.62	104,816.76	995,345.36
15	Annual present value (13+14)		0.75	0.5625	0.4219	0.3164
		1.000	611,060.07	510,143.41	428,151.19	314,927.27
						227,794.04

16 Total Present Worth = 611060.07 + 510143.14 + 428151.19 + 314927.27 + 227794.04  
= 2092075.98

17 Net Present Value (16 - 3) = 2092075.98 - 436500 = 1655575.98

**TABLE 4**  
**DETERMINATION OF RETURN ON INVESTMENT**  
**PERFORMANCE NATION**

		1 YR	2 YRS	3YRS	4YRS	5YRS
	<b>INCOME STATEMENT</b>					
1	Sales Revenue	594,000.00	742,500.00	918,125.00	928,125.00	938,125.00
2	Cost ad Expenses					
	i. Annual Manuf. Cost	65,694.00	80,807.00	98,289.23	119,379.96	145,731.07
	ii. Annual Gen. Expes.	-	-	-	-	-
	iii. Annual Depreciation	28,190.00	21,142.50	15,856.88	11,892.66	8,919.45
	iv. 24% Tax	350,056.76	449,279.12	572,459.88	546,952.10	514,521.73
2 - T	Total of line 2	443,940.76	551,228.62	686,605.99	678,225.35	669,172.25
3	Net Income (1 - 2T)	150,059.24	191,271.38	231,519.01	249,899.68	268,952.75
4	Assets	436,500.00	436,500.00	436,500.00	436,500.00	436,500.00
5	Profit Marging (3/1)x100	25.262	25.160	25.217	26.925	28.669
6	Asset turn over (1/4)	1.3608	1.7010	2.1034	2.1263	2.1492
7	Return on investment (3/4)x100	34.38	43.82	53.04	57.25	61.62



**TABLE 5**  
**SALES REVENUE**

PRODUCT	SELLING PRICE	YEARS				
		1	2	3	4	5
Quattro Bags	120.00	328,409.4	360,053.9	420,460	431,225	437,200
Laminated Sacks	40.00	163,286.6	228,715.2	309,215	319,215	320,200
Sacks (Ordinary)	25.00	102,304.0	136,072.0	188,450	177,685	180,725
		594,000	742,500	918,125	928,125	938,125

**TABLE 6**  
**BALANCE SHEET AT COMMENCEMENT OF PRODUCTION**

FIXED ASSETS	COST (N,000)	CURRENT ASSETS	COST (N,000)	CAPITAL RESERVES &	COST (N,000)
Land & Building	450,000	Stocks	65,694	Share Capital	46,291.98
Production Equipment	163,500	Debt. & Repay.	37,480	Revaluation	
Generator	10,000	Cash & Bank		Reserves	28,190.00
Vehicle	5,700	Balance	378,246.76	General Reserves	
Furniture & Fittings	8,000				180,121.25
Other Fixed Assets	204,550				
DEPRECIATION	-	DEPRECIATION	-	DEPRECIATION	
TOTAL	392,200	TOTAL CURRENT ASSETS	481,420.76	SHARE HOLDERS FUND	254,603.23

### 5.0 CONCLUSION

A total of N4.1209 billion will be realised in the first five years. Unit price increases of 4% were effected for year 3 and 4. The balance sheet at the commencement of the production is as shown in table 6.

An observation of the cash flow pattern, present worth and net present value for five years is shown in table 3. Profit and loss statement shows that the pay back period is reasonable.

The return on investment at the end of first five years gave a value of 61.62%. at a glance, this project is very viable. The pay back period and the average rate of return appraisal techniques do not take into account the time value of money and other associated liabilities, they are considered absolutes and impradictable.

Modern accounting evaluation estimates ad sensitizes such as the net present value (NPV) and internal rate of return (IRR) are better and more reliable assessors. These were calculated for this project and are represented on table 3.

Using an initial investment of N541.3 million and a discount factor of 25%, the net present value of the investment turned out to be very high with a cash value surplus of N331.2 million at the end of five years.

If the profit after tax is not allocated as dividends but ploughed back into business, the project will have an increasing amount of capital for further investment or expansion as time goes on.

### 5.10 RECOMMENDATION

This study has dealt with the most common but important aspect usually considered when the feasibility of investment of this nature are being investigated. It is not by any means exhaustive. This implies that when different type of machines, equipment, production schedules a well as organizational policy are required, a

more detailed study may be required. In that case, the pattern of operations as well as profit vary from this.

Where the project has generated sufficient interest to be founded, it is very critical to engage qualified personnel in all sectors to form a dynamic management team with a clear vision to achieve the formulated corporate goals and objectives.

It is particularly useful for Government to introduce some incentives such as tax waivers, insurance, land etc in order to encourage investors and therefore speed up our self-sufficient as well as technological development.

## APPEDIX I

### 5.20 LIST OF MAJOR MACHINES/EQUIPMENT

1. 2 x complete set of Hengchen (Hcl 4) extending machine comprising gramule mixing unit, water quench/driller, tape scratch equipment and cane winder.
2. 22 x Hengchen (Hcl 4) circular looms with creel capacity 600 – 700 bobbins, warp bobbins single, 26mm ID, weft bobbins 230mm length and main drive motor – 5HP by size.
3. 2 x Yoata (YT 1400) circular loom, jumbo size with creel capacity 1200 bobbins, warp bobbin size – 266mm – ID and weft bobbin – 230mm length.
4. 2 x Yoala (YT 800 A) circular loom of standard size.
5. 2000 packets Aluminum bobbin cones (new)
6. 2 x 2 colour printing machine
7. 2 x 3 colour PAI – YINN printing machine type 403
8. 2 x laminating machines
9. 2 x cooling/laminating machines model Barmag type 684/240
10. 2 x Automatic conversion line with in built sewing machine (singer and fischhe) type lenzing plastic machine model 815/5/100/810/B1
11. 1 x grinding machine
12. 2 x heating tube for sulzer HACOBA
13. 4 x warpig machine type HACOBA
14. 2 x liba knitting machine type G504/0
15. 1 x 293 KVA perkins generator complete with industrial panel.
16. 1 x 250 KVA perkins generator complete with industrial panel
17. 2 x 30 tone forklift type linde H250
18. Lot metal/steel bobbins cone
19. 2 x Automatic eat acting maching type F14
20. 2 x Bailing presses
21. 2 x computers and accessories

22. compressors

23. Heat exchanger.



**APPENDIX II**  
**CAPITAL COST**

<b>FIXED ASSETS</b>	<b>COST (N,000)</b>
1. Land	3,000
2. Building (Design Planning and Road Works)	150,000
3. Computers & Accessories	2,000
4. Machinery and Equipment	163,500
5. Vehicles	5,700
6. Office Equipment	8,000
7. Management Houses	30,000
8. Medical Equipment	11,000
9. Recreation Facilities	9,000
10. Generating Plant	10,000
	-----
<b>TOTAL FIXED INVESTMENT</b>	<b>392,200</b> =====

**APPENDIX III  
DEBT SERVICE**

YEAR	INTEREST (N,000)	AMORTIZATION (N,000)	TOTAL (N,000)
1	37480	-	37480
2	37480	19540	57020
3	33310	23710	57020
4	29150	27870	57020
5	24990	32030	57020
6	20820	36200	57020
7	16660	40360	57020
8	12490	44530	57020
9	8330	48690	57020
10	4160	52860	57020

## APPENDIX IV

### ANNUAL RAW MATERIALS COSTS

PRODUCT TYPE	REQUIREMENTS	COST / KG	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
	AT 100% INSTALLED CAPACITY ( )		60% (N,000)	75% (N,000)	90% (N,000)	90% (N,000)	90% (N,000)
Polypropylene resins	21202.4	6.553	8265.61	8333.32	9037.29	9092.39	9149.39
Sewing Year	7071	62.23	264.82	330.02	396.025	396.025	396.025
Printing, dye/pigments	300	690.56	1171.15	1463.76	1756.51	1756.512	1756.51
Printing auxiliaries	4200	708.54	273.42	341.901	410.281	410.287	410.287
<b>SUB TOTAL</b>	16373.4	827.678	9975	10469	10600.1	10655.2	10712.2
Contingency at 5% of annual cost			525	551	557.9	560.8	563.8
<b>Total Amount Cost</b>			10500	11020	11158	11216	11276

The cost include purchasing, ordering and carrying costs of the  
inventory.

## APPENDIX V

### LABOUR REQUIREMENT AND COST

<u>Level of Manpower</u>	<u>No. of Staff</u>	<u>Unit Cost</u>	<u>Total Cost</u>
Senior Manager	1	1,200,000	1,200,000
General Manager	1	900,000	900,000
Plant Manager	1	900,000	900,000
<u>Administrative and Finance</u>			
Manager	1	900,000	900,000
<u>Management</u>			
Production	1	900,000	900,000
Technical services	1	720,000	720,000
Accounts	1	720,000	720,000
Administration	1	720,000	720,000
<u>Supervisory</u>			
General Managers Office	2	540,000	1,080,000
Production	9	540,000	4,860,000
Technical Services	2	540,000	1,080,000
Accounts	2	540,000	1,080,000
Administration	1	540,000	540,000
<u>Skilled Workers</u>			
General Managers Office	1	360,000	360,000
Production	13	360,000	64,800,000
Technical Services	7	360,000	25,200,000
Accounts	4	360,000	14,400,000
Administration	3	360,000	10,800,000
<u>Workers</u>			
General Managers Office	7	180,000	12,600,000
Production	19	180,000	34,200,000

Technical Services	6	180,000	10,800,000
Administration	1	180,000	180,000
	-----		-----
TOTAL	92		24,300,000,000.00
			=====



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**TABLE 7**  
**FINANCIAL CHARGES (N,000)**

<b>YEAR</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>CAPACITY UTILIZATION</b>	<b>100</b>	<b>60%</b>	<b>75%</b>	<b>90%</b>	<b>90%</b>	<b>90%</b>
Store Capital (47%)	254,603.23	254,603.23	254,603.23	254,603.23	254,603.23	254,603.23
Retained Earnings	-	203,218.38	245,782.06	292,086.82	282,369.01	266,180.32
Total Shareholders Fund	254,603.23	457,821.61	500,385.29	546,690.05	539,972.24	520,783.55
Term Loan	178,763.97	178,763.97	178,763.97	178,763.97	178,763.97	178,763.97
Over Draft	108,341.80	108,341.80	108,341.80	108,341.80	108,341.80	108,341.80
Total Debt	287,105.77	287,105.77	287,105.77	287,108.77	287,108.77	287,108.77
<b>CAPITAL EMPLOYED</b>	<b>541,709.00</b>	<b>744,927.38</b>	<b>787,491.06</b>	<b>833,798.82</b>	<b>827,081.01</b>	<b>807,892.32</b>