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PRE-FEASIBILITY STUDY REPORT FOR THE ESTABLISHMENT OF A MEDIUM-SCALE FUFU FLOUR PRODUCTION PLANT

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SUMMARY

This report is designed to facilitate investment decision making by those interested in the establishment of a Food Processing Plant to produce dehydrated products from yam, cocoyam, plantain and cassava.

Products considered in this report are dehydrated yam, cocoyam and plantain (YCP) flour and their respective fufu powders.

Factors affecting the location of the plant are considered; these include availability of raw material, electrical power, labour, water, facilities for waste disposal, transport and availability of land for the plant.

The plant is costed on a one-shift-per day, 6-day per week basis.

The total cost of the project is estimated at ¢119,629,770.00.

Total fixed capital outlay for the plant is estimated at ¢87,194,400.00 with annual operating costs of ¢129,741,500.00.

It is recommended that the total project cost should be financed through an equity contribution of ¢22,415,400.00 and a foreign loan equivalent of ¢97,214,370.00.

The venture has equity to loan ratio of 1:4.3.

The venture projects in increase in income from ø53,843,930.00 to ¢131,130,140.00 in the first five years of operation under tax-free incentive and a Return on Investment averaging 75% over the period of ten years.

The Net Cash Flow varies between ¢66,863,370.00 and ¢179,706,700.000 over the period of ten years and Cumulative Net Cash Flow by the end of the period amounts to ¢881,287,360.00.

The venture has a 14% break-even point and a financial Internal Rate of Returns (IRR) of 64% which is higher than the present opportunity cost of capital which stands at 29%.

Sensitivity Analyses on the project show that with a 10% reduction in revenue, the IRR is 42% whilst a 10% increase in production cost results in IRR of 54%.

The report concludes that, given the factor costs used and the assumptions made, the venture is technically feasible, financially viable and socio-economically desirable.

1.0 INTRODUCTION

This report is a Promotional Paper that discusses the feasibility of establishing and operating a Food Processing Plant for the production of variety of flours from cocoyam, yam, plantain and cassava. Its main objective is to provide guidance to assist entrepreneurs make investment decisions, i.e.

i) to determine the cost of the project,
ii) to consider whether or not the project is technically feasible, economically viable and socially desirable,
iii) to assess the social contribution to the economic development of Ghana.

Many visitors/entrepreneurs to the Food Research Institute have expressed interest in establishing a Food Processing Plant to produce dehydrated products. Dehydration is a useful means of preserving perishable agricultural produce with limited storage properties. It also helps in obtaining a wider market for commodities which otherwise may have been available only for certain seasons of the year.

The Food Research Institute developed the technique and the technology for the production of dehydrated flour products from cocoyam, yam, plantain and cassava among others.Two of such products are the yam, cocoyam and plantain (YCP) flour and the instant yam, cocoyam and plantain fufu powder. The former has the base commodity i.e. yam, cocoyam and plantain as the only ingredient while the latter is a blend of the base commodity with cassava starch.

The flour is used in the preparation of " amala " , a very popular Nigerian dish. The instant fufu powder is used in the preparation of fufu which is a very popular Ghanaian dish consumed by most people in the West African subregion and even beyond. Amala and fufu are prepared by mixing the respective flour or powder with water into a paste and cooking it on medium heat with constant stirring for about 15 to 20 minutes. It is then moulded into balls and served with soup.

It should be noted that fufu and amala are consumed by West Africans especially Ghanaian and Nigerian residents in Europe, U.S.A. and Australia and therefore considerable export market potential exists for these products.

The report includes typical flow sheets for the production of YCP flours and their fufu flours. It also identifies some important factors to be taken into account when considering such a venture, evaluates the financial viability and tests the sensitivity of certain key variables.

2.0 TECHNICAL CONSIDERATION

The technical feasibility of the project is discussed in three parts, namely:

Location
Technology
Production Plant

2.1 LOCATION

The processing plant should be sited in an area where the raw materials supply is guaranteed all year round, preferably in the Techiman District of the Brong Ahafo Region. The site should boast of good and reliable water supply system and also regular electricity supply from the national grid so that utility requirements of the plant can be met.

Farmers, farmers' cooperatives, farming enterprises, etc in the area where the plant would be sited should be willing to supply the plant with materials and be prepared to enter into agreement with the management of the project to supply the plant with raw materials all year round in required quantities. The project can also purchase raw materials from the market at Techiman and other areas in the district. (The project can go into farming in due course to feed the plant).

Figures in Table 1 show that all the raw materials required for the project are available at Techiman District.

Table 1: Production estimates some districts in Brong Ahafo Region - 1992 (figures in '000 metric tonnes)

District/Crop	Maize	Cassava	Cocoyam	Plantain	Yam
Dorma Ahenkro	17,771	89,813	45,960	8,170	-
Tano	10,930	103,989	24,880	24,194	-
Nkoranza	18,940	88,491	-	13,506	79,360
Kintampo	5,430	22,340	-	-	116,100
Techiman	14,090	210,510	16,630	11,996	77,350

Source : PPMED (Statistics Division), MOA, 1992

2.2 TECHNOLOGY

The processes involved in the production of yam, cocoyam and plantain (YCP) flour and YCP fufu flour are shown in figure 1.

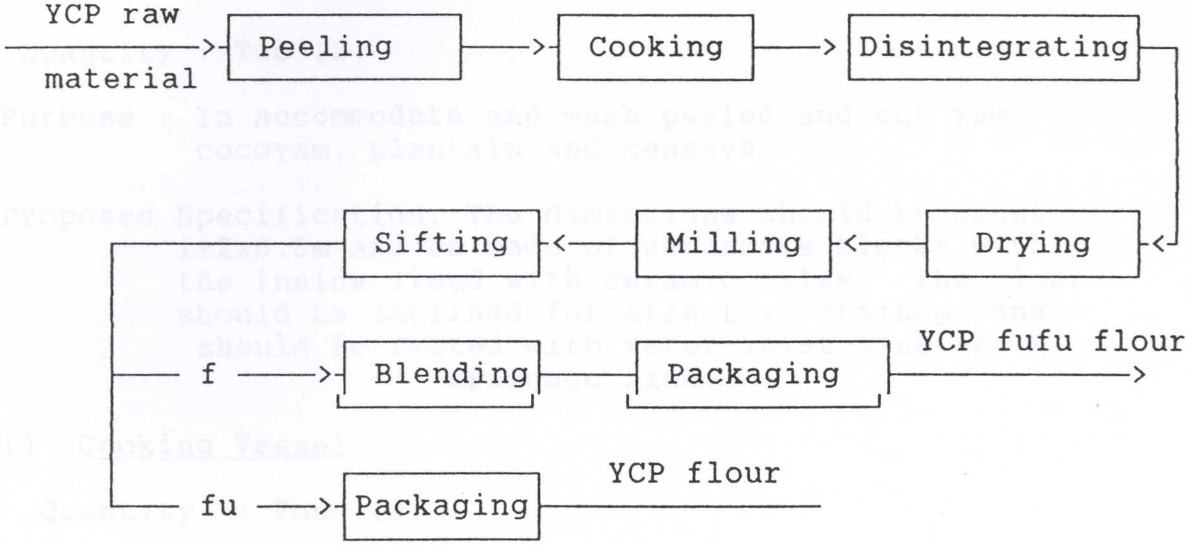

Figure 1: Process Flow Diagram for YCP fufu and YCP flour.

2.2.1 BY-PRODUCTS/WASTE PRODUCTS

By-products/waste products to be realized from the processing plant are the peels from yam, cocoyam, cassava and plantain. These can be used as feed for the livestock industry. Peels from plantain can be used as raw material for soap production.

2.3 PRODUCTION PLANT MODEL

The Production Plant Model chosen is based on a one-shift-per day, 6-day-per week and 48 weeks per year with a production target of 86 metric tonnes of YCP flour and 54 metric tonnes of YCP fufu flour per year. With material recovery of 25% for the YCP flour and 10% recovery for cassava starch, raw material requirements estimated at 461 metric tonnes of Yam/Cocoyam/Plantain and 221 metric tonnes of Cassava will be processed by the Plant annually.

2.3.1 PLANT COMPONENTS

The production plant consists of the following components:

i) Washing Trough

Quantity : Two (2)

Purpose : To accommodate and wash peeled and cut yam, cocoyam, plantain and cassava.

Proposed Specification: The dimensions should be about 1x2x0.5m and be made of sandcrete blocks with the inside lined with ceramic tiles. The floor should be inclined for effective drainage and should be fitted with water inlet line and a drainage line.

ii) Cooking Vessel

Quantity : Four (4)

Purpose : To cook and blanch yam, plantain and cocoyam.

Proposed specifications: Volume of vessel should be about 0.5 cu.m. and capable of accommodating and cooking at least 62.5kg of yam or cocoyam a plantain at a time. The cooking vessel should be supplied with cooking basket with features to allow its lifting by hoist.

iii) Mobile hoist

Quantity : One (1)

Purpose : To lift and lower cooking baskets from and into cooking vessels.

Proposed specs: The lifting capacity of the hoist should not be less than 200kg. It can either be electrical or mechanical and must be installed on a mobile support system.

iv) Receptacle

Quantity : Twenty (20)

Purpose : To accommodate cooked and blanched products to be delivered to the disintegrator or dryer when required. It will also accommodate products from the disintegrator.

Proposed specs: The receptacle should be made from aluminium sheets or high tensile plastic materials and should also be mobile and be capable of holding at least 35kg cooked product at a time.

v) Disintegrator

Quantity: Two (2)

Purpose : To break the cooked products into smaller pieces.

Proposed specs: One should be manually operated and the other electrically operated. Capacity should be at least 500kg per hour.

vi) Dryer

Quantity : Two (2)

Purpose : To dehydrate the blanched and the disintegrated food products.

Proposed Specifications: Dryers should be capable of producing 250kg of dried product within 12 hours.

vii) Holding tank

Quantity : One (1)

Purpose : To accommodate products from the dryer to be delivered to the mill.

Proposed specification: Should be capable of accommodating 500kg of dried product, made of aluminium, galvanized steel or plastic materials and must be mobile.

viii) Hammer mill

Quantity: One (1)

Purpose : To mill products after drying.

Proposed specification: Should be capable of milling at least 250kg of dried product per hour. Should be both electrical and diesel engine operated.

ix) Mechanical Siever

Quantity: One (1)

Purpose: To sift the milled flour to the required particle size.

Proposed specification: The sifting capacity must at least 100kg per hour. Alternatively, 3 to 5 manual sieves could be used.

x) Weighing machines and scale

Quantity : One each

Purpose : To weigh final products in 0.5kg, 1.0kg and 2.0kg polyethylene bags and raw materials.

Proposed specification: The machines should be mechanical and one must have a maximum scale of 5 or 10kg and the other 210kg.

xi) Sealing machines

Quantity : Two (2)

Purpose : To seal polyethylene bags containing the finished products.

Proposed specifications: The heat sealer must have a variable heat output with at least 2mm in width of the sealing land.

xii) Grater

Quantity : One (1)

Purpose : To grate the peeled cassava for the preparation of starch.

Proposed specifications: One capacity should be about 300kg per hour. The grating surface can be either horizontal disc or cylindrical mass.

xiii) Sedimentation Trough

Quantity : Two (2)

Purpose: To accommodate the starch slurry for sedimentation.

Proposed specs: They should be made of sandcrete blocks and the inside lined with ceramic tiles. The (1x2x0.5m) rectangular troughs should have water inlet line and an drainage line.

xiv Industrial Gas Stove

Quantity : Four (4)

Purpose : To supply heat energy during cooking and blanching of the products.

Proposed specs: Should have accessories such as the Industrial cylinder with pipeline network supplying the four stoves through high pressure regulators.

xv) Others

In addition to the above mentioned units of the plant, items such as knives, working tables and stools should be secured for smooth operation of the plant. Protective gears and equipment such as gloves, overcoats, ear baffles, nose caps,head caps, fire fighting equipment, etc. should be provided.

3.0 MARKET CONSIDERATIONS

3.1 GENERAL OBSERVATIONS

Two potential markets exist for the products - domestic and foreign. The products are used in preparation of very popular dishes which are consumed in Ghana, Nigeria and other countries in the West African subregion as well as by Ghanaian and Nigerian residents in USA, Europe and Australia.

Factors favourable to the success of these products on the local market include the following:

i) Labourious preparation of traditional fufu - The traditional fufu is prepared by cooking the yam/cocoyam/plantain and cassava and pounding the mixture in appropriate proportions in a mortar with pestle. It is then moulded into balls and served with soup. This process is very labourious and time consuming.

ii) Ease in preparation of the flours - Here the flours are mixed with water to form a paste which is cooked on medium heat with constant stirring for about 10 to 15 minutes. It is then moulded into balls and served with soup. This process is far less labourious and also time saving.

iii) Price hikes of seasonal commodities - The sharp increases in prices of these commodities during their lean seasons would compel the general public to patronise the products of the project whose prices will not increase appreciably during the lean seasons.

iv) Novelty - Being relatively new products, they command some novelty attraction and also have the potential to expand the market nationwide.

It must be noted that market developed with FRI products has generated consumer acceptability leading to increased demand at local and foreign markets.

As far as the foreign market is concerned the products exist there, but with competitive pricing policy and good quality natural products, they can compete favourably.

3.2 MARKET ARRANGEMENTS

Locally, the products are mostly to be distributed through the departmental shops, supermarkets and the open markets.

For the foreign markets, efforts should be made find foreign markets directly in Europe, especially in Britain, Germany, Holland and France and the USA or local exporting companies should be commissioned to handle the export of the products.

For a start, only the flours would be exported whilst the instant fufu powder would be sold locally.

3.3 MARKET PRICES AND PRICING POLICY

The pricing policy is based on the unit cost of production of the various products. Retail prices of similar products recently introduced into the local market have also been taken into consideration during the pricing. For example, at present the Food Research Institute (FRI) sells fufu flour products at ¢2,000.00 per kilogram, whilst an imported fufu flour from USA sells at ¢2,100.00 per 450 grams. Hence, the prices for the products are as follows:

Domestic Price	Wholesale Price(¢)	Retail Price(¢)
YCP flour, 1kg	1,980.00	2,200.00
YCP fufu flour, 1kg	1,800.00	2,000.00

Export Price	FOB ($)	CIF ($)
YCP flour, 1kg	3.00	4.50

The retail prices quoted above include 8% sales commission for supermarkets and departmental shops and 1% for transportation.

The pricing policy adopted here is strictly that of competitive pricing. With only the instant fufu from USA and occasional production of these products by FRI on the local market, this competitive pricing will enable the products of the project to capture a greater share of the market and also expand it to other parts of the country.

3.4 MARKETING OF BY-PRODUCTS/WASTE PRODUCTS

The by-products/waste products would be sold to organizations and individuals who are engaged in the livestock and soap industries.

4.0 FINANCIAL ANALYSIS

4.1 PROJECT COST

The entire cost of the project is estimated at ¢119,629,770.00. A summary of the project cost is presented in Appendix I with details in schedules "A" to "F" of Appendix II.

4.2 PROJECT FINANCING PLAN

The project cost of ¢119,629,770.00 can be financed primarily through an equity contribution of ¢22,415,400.00 and foreign loan equivalent of ¢97,214,370.00. Appendix III shows the project financing plan which indicates that the equity-to-loan of the project is 1:4.3

4.3 LOAN AND INTEREST PAYMENTS

In this study, it is assumed that the loan will attract the following terms:

i) Interest rate of 30% per annum
ii) Repayment period of six years
iii) A one-year moratorium on the principal.

The principal loan and its interest payments are presented in Appendix VI.

4.4 PROJECT INCOME STATEMENT

Appendix IX shows he Proforma Income and Expenditure Statement of operations of the project. It shows the three basic parts - Revenue, Expenses and Income

4.4.1 REVENUE

Revenue accruing from the project would be derived from the following:

i) Yam, Cocoyam and Plantain Flour
ii) Yam, Cocoyam and Plantain Fufu Flour

Appendix IX shows that the project would generate a revenue of ¢248,098,000.00 in the first year and ¢452,801,680.00 in the tenth year.

4.4.2 EXPENSES

Total operating expenses presented in Appendix IX show an increase from ¢189,254,070.00 in the first year to ¢297,145,870.00 n the tenth year. Increase in operating expenses over this period is caused by anticipated inflationary trends in the country.

4.4.3 INCOME

Appendix IX also shows an increase in Tax-free Income from the operations of the project from ¢53,759,430.00 to ¢127,788,330.00 in the first five years. The project is expected to record Income After Tax from ø76,925,380.00 to ø85,610,700.00 from sixth to tenth year. Return on Investment for the ten year period averages 75%.

4.5 CASH FLOW STATEMENT

The Cash Flow Statement presented in Appendix X indicates that the Net Cash Flow, after meeting all financial obligations, will be ¢66,863,370.00 in the first year and decrease to ¢63,291,820.00 in the second year and then increase over three years to ¢119,706,700.00. Cumulative Net Cash Flow will be ¢988,766,390.00 by the end of the tenth year.

4.6 DISCOUNTED CASH FLOW STATEMENT

The discounted cash flow statement of Appendix XI reveals that the venture has a financial Internal Rate of Return (IRR) of 64% after the project has settled all its financial obligations. The IRR is considerably high compared with the opportunity cost of capital which presently stands at about 29%.

4.7 SENSITIVITY ANALYSES

The venture was further subjected to sensitivity analyses under the following assumptions:

i) A 10% reduction in annual revenue.
ii) A 10% increase in production cost.

The results of the analyses shown in Appendices XII and XIII show IRR values of 42% and 54% for 10% reduction in revenue and 10% increase in production cost respectively. These values are still higher than the opportunity cost of capital.

5.0 SOCIO-ECONOMIC CONSIDERATION

5.1 CONTRIBUTION TO INDUSTRY

The project will further government's policy of developing and expanding agro-based industries in the country. The trend of processing agricultural produce beyond the raw material stage will be increased. The project will help to some extend, alleviate the supply shortage and maintain the prices of the commodites during their lean seasons.

5.2 EMPLOYMENT

The project will provide job opportunities for 23 Ghanaians whose salaries and benefits will amount to ¢20,804.000.00. Their employment will further contribute ¢1,508,000.00 to the SSNIT. The project would therefore not only provide jobs but it will also contribute to the social development of Ghana.

5.3 DEVELOPMENT OF INDIGENOUS TECHNOLOGY

The technologies for producing the flour products have been developed locally by FRI (and other private organizations). The project will further develop these technologies for mass production, thus breaking new grounds in the development of new indigenous technologies in the yam, plantain cocoyam, maize and cassava flour production. Most of the processing machines for the plant have also been developed by FRI, IRI and other privately owned local engineering companies and acquisition of some of the machines from these organizations will help the development of such organizations.

5.4 FOREIGN EXCHANGE GENERATION

The project estimates that 47.5% of its output will be exported. Export revenue in the first year estimated at $285,000.00 will help pay back the foreign loan component of the project and also contribute towards the nation's foreign exchange earnings.

5.5 ENVIRONMENTAL CONTROL

The plant for the project does not produce any waste that is hazardous to the environment. By-products and waste products are all reuseable and therefore the project can be said to be environmental friendly.

5.6 POPULATION AND FOOD SECURITY

With the present size of the nation's population and an annual growth of about 3%, the project will contribute to increase the volume of processed food products, which is one of the major ways of ensuring the availability of food throughout the year at affordable prices.

APPENDIX I

S U M M A R Y   O F   P R O J E C T   I N V E S T M E N T

	COST (¢'000)
BUILDING AND CIVIL WORKS	44000.00
PLANT EQUIPMENT AND MACHINERY	22856.90
MOTOR VEHICLE	16500.00
OFFICE EQUIPMENT AND FURNITURE	2337.50
WORKING CAPITAL (3 MONTHS)	32435.37
PRE-OPERATIONAL COST	1500.00
TOTAL COST OF PROJECT	119629.77
FIXED CAPITAL EXPENDITURE, (¢'000)	87194.40
RECURRENT EXPENDITURE, (¢'000)	129741.50
BREAK EVEN POINT, %	14.00

APPENDIX II

Schedule "A"

BUILDING AND CIVIL WORKS

	COST(¢'000)
Land and Yard Improvement	5000.00
Building	35000.00
10%Contingency	4000.00
TOTAL	44000.00

Schedule "B"

PLANT EQUIPMENT AND MACHINERY

	QTY	UNIT COST	TOTAL COST(¢'000)
Washing Trough	2.00	180.00	360.00
Cooking Vessel	4.00	100.00	400.00
Mobile Hoist	1.00	300.00	300.00
Receptacle	10.00	30.00	300.00
Disintegrater	1.00	450.00	450.00
Hot Air Cabinet Dryer	2.00	6000.00	12000.00
Mobile Holding Tank	1.00	150.00	150.00
Hammer Mill	1.00	1500.00	1500.00
Sieving Machine	1.00	450.00	450.00
Weighing Machine (0-10kg)	2.00	90.00	180.00
Weighing Machine (0-200kg)	1.00	500.00	500.00
Sealing Machine	2.00	100.00	200.00
Cassava Grater	1.00	500.00	500.00
Sedimentation Trough	2.00	250.00	500.00
Industrial Gas Stove (with accessories)	4.00	200.00	800.00
Knives, Tables, and Stools	-	300.00	300.00
10%Contingency			1889.00
SUB TOTAL			20779.00
10%Handling, Installation, etc. charges			2077.90
TOTAL			22856.90

Schedule "C"

MOTOR VEHICLE

	QTY	UNIT COST	TOTAL COST(¢'000)
Toyota/Mitsubishi Pickup	1.00	15000.00	15000.00
10%Contingency			1500.00
TOTAL			16500.00

APPENDIX II

Schedule "D"

OFFICE EQUIPMENT AND FURNITURE

	QTY	UNIT COST	TOTAL COST(¢'000)
Tables, Desks, and Chairs	-	-	500.00
Office Safe	1.00	250.00	250.00
Steel Cabinet	1.00	225.00	225.00
Typewriter	1.00	1100.00	1100.00
Electric Calculator	1.00	50.00	50.00
10%Contingency			212.50
TOTAL			2337.50

Schedule "E"

WORKING CAPITAL
(For 3 months)

	COST (¢'000)
Direct Production Cost	29126
Administrative Cost	3309
TOTAL	32435.37

Schedule "F"

PRE-OPERATING AND START-UP COSTS

	COST (¢'000)
Feasibility Studies Fee	900.00
Travelling and Lodging	300.00
Documentation	100.00
Communication	100.00
Miscellaneous	100.00
TOTAL	1500.00

APPENDIX III

PROJECT FINANCING PLAN

	EQUITY	LOAN	TOTAL (¢'000)
Building and Civil Works		44000.00	44000.00
Plant Equipment and Machinery	-	20779.00	20779.00
Vehicle	16500.00	-	16500.00
Office Equipment and Furniture	2337.50		2337.50
Working Capital	-	32435.37	32435.37
Pre-operational Cost	1500.00	-	1500.00
Handling and Installation Cost	2077.90	-	2077.90
TOTAL	22415.40	97214.37	119629.77

EQUITY : LOAN RATIO = 1: 4.34

APPENDIX IV

Schedule "A"

MANPOWER REQUIREMENT AND REMUNERATIONS

INDIRECT LABOUR

	NUMBER	ANNUAL BASIC SAL.(¢'000)	ANNUAL TOTAL(¢'000)
General Manager	1.00	1920.00	1920
Accountant	1.00	1200.00	1200.00
Storekeeper/secretary	1.00	600.00	600.00
Driver	1.00	480.00	480.00
Security Personnel	3.00	360.00	1080.00
Unskiiled Labourer	1.00	300.00	300.00
Sub Total			5580.00
12.5% Social Security			698
60.0% Other Allowances G.A.E			3348.00
TOTAL			9626

Schedule "B"

DIRECT LABOUR

	NUMBER	ANNUAL BASIC SAL.(¢'000)	ANNUAL TOTAL(¢'000)
Supervisor/Technician	1.00	960.00	960.00
Factory Hands (Skilled)	3.00	480.00	1440.00
Mill Operator	1.00	480.00	480.00
Factory Hands (Unskilled)	10.00	360.00	3600.00
Sub Total			6480.00
12.5% Social Security			810.00
60.0% Other Allowances G.A.E			3888.00
TOTAL			11178.00

Schedule "C"

OPERATING SUPPLIES

	COST (¢'000)
Fuel and Lubricants	3555.00
Repair and Maintenance	2666
Electricity	12000
Water	3000
Gas	6000
Packaging Material	15000
10.0%Contingency	4222
TOTAL	46443

APPENDIX V

DEPRECIATION, REPAIR, MAINTENANCE AND INSURANCE

	VALUE (¢'000)	DEPRECIATION RATE	DEPRECIATION VALUE(¢'000)	REPAIR AND MAINTENANCE RATE	REPAIR AND MAINTENANCE VALUE(¢'000)	INSURANCE RATE	INSURANCE VALUE(¢'000)
Building	44000.00	5%	2200.00	2%	880	0.75%	330
Plant Equipment	22857	10%	2286	4%	914	0.50%	114
Motor Vehicle	16500.00	20%	3300.00	5%	825	5.00%	825
Furniture and Office Equip	2337.50	10%	233.75	2%	47	0.50%	12
TOTAL			8019		2666		1281

FUEL AND LUBRICANTS CONSUMPTION COST (FOR VEHICLE)

	CONSUMPTION RATE PER DAY	WORKING DAYS PER YEAR	TOTAL PER YEAR(GALS.)	COST (¢'000)
Diesel	5.00	300.00	1500.00	2430.00
15.0%Lubricant	0.75	300.00	225.00	1125.00
TOTAL				3555.00

Cost of diesel per gallon: 1620.00
Cost of lubricant per gal: 5000.00

APPENDIX VI

L O A N A N D I N T E R E S T R E P A Y M E N T S

Principal : 97214.37
Interest Rate : 30%
Repayment Period : 6.00 years
Moratorium : 1.00 year

YEAR	LOAN OUTSTANDING (¢'000)	PRINCIPAL REPAYMENT (¢'000)	INTEREST REPAYMENT (¢'000)	TOTAL REPAYMENT (¢'000)
1.00	97214.37	0.00	29164.31	29164.31
2.00	97214.37	19442.87	29164.31	48607.19
3.00	77771.50	19442.87	23331.45	42774.32
4.00	58328.62	19442.87	17498.59	36941.46
5.00	38885.75	19442.87	11665.72	31108.60
6.00	19442.87	19442.87	5832.86	25275.74

APPENDIX VII

D I R E C T   P R O D U C T I O N   C O S T (¢'000)

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
Raw Materials	58883.80	61827.99	64919.39	68165.36	71573.63	75152.31	78909.92	82855.42	86998.19	91348.10
Direct Labour	11178.00	12296	13525	14878	16366	18002	19803	21783	23961	26357
Operating Supplies	46443	51087	56196	61816	67997	74797	82277	90505	99555	109510
TOTAL	116505	125211	134641	144859	155937	167952	180989	195143	210514	227216

PRICES OF COMMODITIES AT TECHIMAN
Released by PPMMD of Min. of Agriculture on 11th Sept. 1993

YAM	90000.00 per tonne
COCOYAM	120000.00 per tonne
PLANTAIN	150000.00 per tonne
CASSAVA	35000.00 per tonne

ASSUMPTIONS: Cost of Raw Materials increases by 5% annually.
Cost of Labour increases by 10% annuallly.
Cost of Operating Supplies increases by 10% annually.

RAW MATERIAL REQUIREMENT

YAM	230.40 MT
COCOYAM	138.24 MT
PLANTAIN	92.16 MT
TOTAL	460.80 MT
CASSAVA	221.00 MT

COST OF RAW MATERIAL PER YEAR	(¢'000)
230.40 MT YAM	20736.00
138.24 MT COCOYAM	16588.80
92.16 MT PLANTAIN	13824.00
221.00 MT CASSAVA	7735.00
TOTAL	58883.80

APPENDIX VIII

Schedule "A"

PRODUCTION OUTPUT

DRYER CAPACITY, KG/BATCH	200.00
NO. OF WORKING DAYS	288.00
NO. OF DRYER	2.00
TOTAL YCP FLOUR, TONNE	115.20
YCP FLOUR PRODUCT, TONNE	86.40
STARCH FLOUR, TONNE	22.10
YCP FUFU PRUFU PRODUCT, TONNE	50.90
WT. OF FINAL PRODUCT, TONN	137.30

TOTAL PLANT CAPACITIES

YCP FLOUR	86.40 METRIC TONNES
YCP FUFU FLO	50.90 METRIC TONNES

Schedule "B"

REVENUE

YEAR	PLANT CAPACITY UTILIZATION %	YCP FLOUR (TONNES)	YCP FLOUR PRICE/T (¢'000)	REVENUE (¢'000)	YCP FUFU FLOUR (TONNES)	YCP FUFU PRICE/T (¢'000)	REVENUE (¢'000)	TOTAL REVENUE (¢'000)
1.00	85.00	73.44	2200.00	161568.00	43.27	2000.00	86530.00	248098.00
2.00	90.00	77.76	2310.00	179625.60	45.81	2100.00	96201.00	275826.60
3.00	95.00	82.08	2425.50	199085.04	48.36	2205.00	106622.78	305707.82
4.00	100.00	86.40	2546.78	220041.36	50.90	2315.25	117846.23	337887.59
5.00	100.00	86.40	2674.11	231043.43	50.90	2431.01	123738.54	354781.96
6.00	100.00	86.40	2807.82	242595.60	50.90	2552.56	129925.46	372521.06
7.00	100.00	86.40	2948.21	254725.38	50.90	2680.19	136421.74	391147.12
8.00	100.00	86.40	3095.62	267461.65	50.90	2814.20	143242.82	410704.47
9.00	100.00	86.40	3250.40	280834.73	50.90	2954.91	150404.96	431239.69
10.00	100.00	86.40	3412.92	294876.47	50.90	3102.66	157925.21	452801.68

SELLING PRICE

RETAIL (¢/KG)	WHOLESALE
2200.00	1980.00
2000.00	1800.00

ASSUMPTION : Selling prices increase by 5% ev

APPENDIX IX

PROFORMA INCOME & EXPENDITURE STATEMENT

A.	YEAR 1 (¢'000)	YEAR 2 (¢'000)	YEAR 3 (¢'000)	YEAR 4 (¢'000)	YEAR 5 (¢'000)	YEAR 6 (¢'000)	YEAR 7 (¢'000)	YEAR 8 (¢'000)	YEAR 9 (¢'000)	YEAR 10 (¢'000)
Direct Production Cost	116504.93	125211.23	134640.96	144859.08	155936.72	167951.71	180989.27	195142.70	210514.20	227215.71
Indirect Labour	9625.50	10106.78	10612.11	11142.72	11699.86	12284.85	12899.09	13544.05	14221.25	14932.31
Distribution Cost	22328.82	24824.39	27513.70	30409.88	31930.38	33526.90	35203.24	36963.40	38811.57	40752.15
Depreciation	8019.44	8019.44	8019.44	8019.44	8019.44	8420.41	8420.41	8420.41	8420.41	8420.41
Overhead Cost	3611.07	3785.20	3973.79	4178.15	4399.71	4640.01	4900.76	5183.83	5491.26	5825.29
Interest on Loan	29164.31	29164.31	23331.45	17498.59	11665.72	5832.86	0.00	0.00	0.00	0.00
TOTAL EXPENSES	189254.07	201111.35	208091.45	216107.86	223651.82	232656.74	242412.77	259254.38	277458.69	297145.87
B. INCOME										
Revenue	248098.00	275826.60	305707.82	337887.59	354781.96	372521.06	391147.12	410704.47	431239.69	452801.68
Net Income before Tax	58843.93	74715.25	97616.36	121779.72	131130.14	139864.33	148734.35	151450.09	153781.01	155655.81
45%Income Tax	0.00	0.00	0.00	0.00	0.00	62938.95	66930.46	68152.54	69201.45	70045.12
Income after Tax	58843.93	74715.25	97616.36	121779.72	131130.14	76925.38	81803.89	83297.55	84579.56	85610.70
RETURN ON INVESTMENT, %	49.19	62.46	81.60	101.80	109.61	64.30	68.38	69.63	70.70	71.56

Average Return on Investment, % : 74.92

Distribution Cost = 9% Revenue (8% as sales commission and 1% as transportation)
Overhead Cost = 2% Direct Production Cost + Insurance
Tax-free period of the first 5 years

APPENDIX X

P R O J E C T E D   C A S H   F L O W   S T A T E M E N T

	YEAR 0	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
CASH INFLOW											
Equity	22415.40										
Loan	97214.37										
Income before Tax		58843.93	74715.25	97616.36	121779.72	131130.14	139864.33	148734.35	151450.09	153781.01	155655.81
Interest on Loan		29164.31	29164.31	23331.45	17498.59	11665.72	5832.86	0.00	0.00	0.00	0.00
Depreciation		8019.44	8019.44	8019.44	8019.44	8019.44	8420.41	8420.41	8420.41	8420.41	8420.41
TOTAL CASH INFLOW	119629.77	96027.68	111899.00	128967.25	147297.75	150815.30	154117.60	157154.76	159870.50	162201.42	164076.23
CASH OUTFLOW											
Total Capital Investment	119629.77										
Principal Repayment		0.00	19442.87	19442.87	19442.87	19442.87	19442.87	0.00	0.00	0.00	0.00
Interest on Loan		29164.31	29164.31	23331.45	17498.59	11665.72	5832.86	0.00	0.00	0.00	0.00
Income Tax		0.00	0.00	0.00	0.00	0.00	62938.95	66930.46	68152.54	69201.45	70045.12
TOTAL CASH OUTFLOW	119629.77	29164.31	48607.19	42774.32	36941.46	31108.60	88214.68	66930.46	68152.54	69201.45	70045.12
NET CASH FLOW		66863.37	63291.82	86192.93	110356.29	119706.70	65902.92	90224.30	91717.96	92999.97	94031.11
CUMULATIVE NET CASH FLOW		66863.37	130155.18	216348.11	326704.40	446411.10	512314.02	602538.32	694256.28	787256.25	881287.36

APPENDIX XI

DISCOUNTED CASH FLOW STATEMENT

YEAR	INITIAL INVESTMENT (¢'000)	NET CASH FLOW (¢'000)	DISCOUNT FACTOR, 64%	PRESENT VALUE 0.64 (¢'000)
0.00	119629.77			
1.00		66863.37	0.6098	40770.35
2.00		63291.82	0.3718	23532.06
3.00		86192.93	0.2267	19540.70
4.00		110356.29	0.1382	15255.33
5.00		119706.70	0.0843	10090.19
6.00		65902.92	0.0514	3387.21
7.00		90224.30	0.0313	2827.59
8.00		91717.96	0.0191	1752.68
9.00		92999.97	0.0117	1083.65
10		94031.11	0.0071	668.09

NET PRESENT VALUE = 118907.84

NET PRESENT VALUE / INITIAL INVESTMENT = 0.9940

INTERNAL RATE OF RETURN = 64%

APPENDIX XII

SENSITIVITY ANALYSIS

ASSUMPTION : A 10% SHORTFALL IN REVENUE

DISCOUNTED CASH FLOW STATEMENT

YEAR	INITIAL INVESTMENT. (¢'000)	NET CASH FLOW (¢'000)	DISCOUNT FACTOR, 42%	PRESENT VALUE 0.42 (¢'000)
0.00	119629.77			
1.00		42053.57	0.7042	29615.19
2.00		35709.16	0.4959	17709.36
3.00		55622.15	0.3492	19425.97
4.00		76567.53	0.2459	18831.77
5.00		84228.51	0.1732	14588.73
6.00		45414.26	0.1220	5539.39
7.00		68711.21	0.0859	5902.14
8.00		69129.21	0.0605	4181.72
9.00		69281.78	0.0426	2951.37
10		69127.02	0.0300	2073.79

NET PRESENT VALUE = 120819.43

NET PRESENT VALUE / INITIAL INVESTMENT = 1.0099

INTERNAL RATE OF RETURN = 42%

APPENDIX XIII

SENSITIVITY ANALYSIS

ASSUMPTION : A 10% INCREASE IN PRODUCTION COST

D I S C O U N T E D C A S H F L O W S T A T E M E N T

YEAR	INITIAL INVESTMENT (¢'000)	NET CASH FLOW (¢'000)	DISCOUNT FACTOR, 54%	PRESENT VALUE 0.54 (¢'000)
0.00	119688.03			
1.00		54962.39	0.6494	35689.86
2.00		50491.14	0.4217	21289.91
3.00		72433.92	0.2738	19832.61
4.00		95558.52	0.1778	16989.73
5.00		103782.52	0.1155	11981.76
6.00		56467.25	0.0750	4233.23
7.00		80070.81	0.0487	3897.89
8.00		80770.45	0.0316	2553.21
9.00		81190.12	0.0205	1666.54
10		81284.31	0.0133	1083.43

NET PRESENT VALUE = 119218.17

NET PRESENT VALUE / INITIAL INVESTMENT = 0.9961

INTERNAL RATE OF RETURN = 54%