## PREFEASIBILITY STUDY ON

# SETTING UP PLANT FOR DRYING FRUITS BY OSMO-AIR DEHYDRATION IN NIGERIA

## DEVELOPED BY STARTUP BUSINESS FOUNDATION

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#### **ABOUT THIS REPORT**

This prefeasibility study is designed to provide potential and startups entrepreneurs' valuable information on setting up Osmo-air dehydration business in the food processing industry of Nigeria's market; aimed at encouraging and facilitating industrial activities across the country. It is our realization that industrialization is at the heart of economic development and that every effort has to be made to bring about industrial growth and encourage our people to be part of it.

Fruit dehydration using Osmo-air facility shows over 80% local content in terms of availability of raw material, equipment and machinery, manpower and other requirements and the market for the product is readily available in different parts of Nigeria.

The key areas covered in this report include:

- i) Technical and economic analysis of the production, marketing and profitability of the project.
- ii) Recommendations in respect of procurement of equipments and associated problems.
- iii) Recommendation on suitable agronomic management practices to ensure efficient running of the projects.
- iv) Detailed financial analysis including project cash flows for the projects.

This prefeasibility report provides a comprehensive and detailed coverage of the above terms of reference and is designed to facilitate investment decisions.

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The implementation of this project will also impact positively on the economy of the immediate community where the project is located. This is in terms of employment-direct and indirect, skilled and unskilled. Government also stands to benefit from internal revenue from taxation.

In view of the result of the analysis using some economic indicators as stated in the proposed project, it is hereby recommended that the project is viable.



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#### PART I EXECUTIVE SUMMARY

1.0

This particular prefeasibility study is on setting up Osmo-air dehydration plant for drying fruits and vegetables in most suitable parts of Nigeria.

There is a wide variety of fruits in Nigeria. The problem is that fruits like mangoes, pineapples, jackfruit, etc., are very perishable. Also, these fruits are harvested seasonally resulting in some seasons of relative scarcity. In order to maintain the availability of fruits throughout the year, the activity of dehydration should be undertaken. Similarly, to retain the freshness, colour, flavor and texture of fruits, the fruits can be Osmo-air dried.

Osmo-air dried fruits are similar to fresh fruits so they are easy to market. This is because unlike dehydration, osmotic dehydration sensorial properties are good and there is no chance of contaminations.

This activity can be set up in rural areas to benefit the rural people. However, the entrepreneur industrial location decision should based on critical factors availability of market and demand that meets the anticipated sales projections.

The annual production capacity of the plant is 45,680kgs per year at 60% capacity utilization.

#### 1.1 SUMMARY OF TOTAL PROJECT COST

S/N	DESCRIPTION	COST	COST TO BE	TOTAL
		INCURRED	INCURRED	
1	Land & building	-	400,000	400,000
2	Plant & machinery	-	1,532,400	1,532,400
3	Utility equipment	-	480,000	480,000
	Total capital cost	-	2,412,400	2,412,400
4	Working capital	-	800,000	800,000
5	10% contingencies &	-	321,240	321,240
	miscellaneous			
	Total project cost	-	3,533,640	3,533,640

## 1.2 FINANCIAL ACCOUNTING RATIOS ANALYSIS PERFORMANCE RATIOS AVERAGES

(a) Return on Sales =18%
 (b) Return on Equity =503%
 (c) Return on Investment =76%

(d) Positive NPV =  $\frac{\text{H}}{9}$ ,991,653

(e) IRR =47% (f) ARR =82%

(g) Payback Period = 1 year and 9 months.



#### PART II MARKET ANALYSIS

#### 2.1 INTRODUCTION

2.0

The market for fruits exists and all year round and suppliers are bound to increase the returns on investment. Supply is recommended to supermarket chains, grocery shops, main markets, as they can help a lot in capturing a portion of the market. With an increased shelf life for the fruits and vegetables, the profit sales ratio is bound to increase.

#### 2.2 MARKET AREA ANALYSIS

According to Postharvest Loss Alliance for Nutrition (PLAN) project, Nigeria experiences about 50% post-harvest losses. For instance, Nigeria is Africa's second largest producer of tomatoes with over 1.5 million tonnes harvested annually. Globally, Nigeria ranks as the 16th largest tomato producing nation in the world and has the comparative advantage and potential to lead the world in tomato production and exports. The country accounts for 68.4 percent of West Africa's output; 10.79 percent of Africa's and 1.2 per cent of total world production of the crop. In the tomato value chain, processing is where an investor can capture the greatest economic value according to the Federal Ministry of Agriculture and Rural Development (FMARD). Similarly, raw materials supply can be a challenge for processors due to post-harvest losses and comparatively lower yields. Consequently, we need to reduce these losses and return them back to the supply chain.

Consequently, we need to reduce these losses and return them back to the supply chain. Hence, this prefeasibility study exposes the investment opportunity in the dehydration of fruits and vegetable is the digit divider.

#### 2.3 MARKET DEMAND ANALYSIS

Demand for healthy food products has risen dramatically in recent years in the world. The findings that indicate that some major diseases such as cancer and obesity are triggered by food products which do not satisfy the necessary sanitation conditions have lead the consumers use organic and decontaminated products. Experts indicate that vegetables should be consumed after drying them whether on their natural growing season or out of season.

In that case, the demand for dried vegetables would always be high since the drying sector is a preferred field of business and has great contributions to economy. Consumers not only make use of the dried vegetables directly, but also they can benefit from the dried vegetables in instant soup, infant food and additive food flour. It also has high export potentials.



#### 2.4 TARGET MARKET ANALYSIS

The market for fruits and vegetable are readily available all round the year in different cities and towns in Nigeria. Nevertheless, there is supply gap as the products (Osmo –air dried fruits) can be steadily supplied to ice cream makers, bakeries, restaurants, fast food places, etc. as well as supplies to the military for the fruits to be used as military rations and it is also necessary for the fruits to capture market.

Similarly, the entrepreneur can as well make sales through order placements from open market sales by operating depot in the metropolitan cities in any part of the country.



## PART III TECHNICAL ANALYSIS

#### 3.1 PROJECT DESCRIPTION

This prefeasibility study is on setting up fruit drying by Osmo- air dehydration. This is an innovative process for fruit drying wherein the dry fruit is comparable to fresh fruit in colour, flavour and texture. For instance, the drying of banana, palm, quince, orange, pineapple, pear, apple kiwi, peach, watermelon and melon can be done using the above facility.

#### 3.2 PROJECT LOCATION

The suitable location for this proposed project is rural areas where there is abundant availability of the raw materials that meets the expected production capacity. Another special consideration is electricity and water supply, although, the entrepreneur can improvise for the later.

#### 3.3 SPECIFICATION AND QUALITY STANDARD

The raw materials as well as the machines used in the production must meet quality norms so that the machines can operate at its best rating to reach its expected life's span. In order to achieve these goals, the entrepreneur is to set their own standard with detailed specifications.

#### 3.4 PRODUCTION PROCESS

Fruits are selected, cleaned, washed, peeled, cured and sliced. The prepared fruits are then soaked in a sugar solution to remove water by osmotic pressure. The slices of fruits are then drained and dried in hot air. The fruits are then packed up in flexible pouches. The plant can have a minimum output of 100kg daily with output to be increased as demand does increase.

#### 3.5 PRODUCTION CAPACITY

The envisaged project has minimum daily capacity of 146kg per day which translates to 45,552kg annually, at 60% capacity utilization.

#### 3.6 CRITICAL SUCCESS FACTORS

The startup entrepreneur should observe the following important factors:

- Abundance of required low cost fruits to ensure optimum working days and capacity utilization.
- Effective Marketing campaign.
- Suitable location with availability of electric power and access roads.



- Daily supply and processing of Fruits due to being highly perishable.
- The entrepreneur is expected to have acquired some level of skill before undertaking this project.

#### 3.7 SOURCES OF FUNDS

The project can be funded through a number of sources which include but not limited to the following; Agric-Business, Small & Medium Scale Investment Scheme (AGSMEIS), Bank of Industry, Bank of Agriculture (BOA), Nigeria Export-Import (NEXIM) Bank, International Finance Corporation (IFC), grants etc., though the conditions and criteria for accessing the loans and grants varies.



#### **PART IV**

#### 4.0 FINANCIAL ANALYSIS

Basically, the financial section of this prefeasibility study consists of three financial statements: Income statement, Balance sheet, Cash flow projection. This section determines whether or not the project is viable using some economic indicators such as Net Present Value (NPV), Internal Rate of Return (IRR), and payback period as are detailed in the appendices below.

#### 4.1 ASSUMPTIONS

- 1. Assuming that the project will last for the period of five years and the salvage value at the end of the project life ignored.
- 2. Depreciation (fixed asset write off) assumes 5 year life of assets written off at 20% per year for all assets.
- 3. The estimated capacity has daily capacity of 146kg with estimated capacity of 45,680kg per annum at 60% capacity utilization, working 312 days annually.
- 4. The proposed capacity utilization are 60% in the first year of commercial production, 70%, 80% in the 2<sup>nd</sup> and 3<sup>rd</sup> year respectively and 90% in the 4<sup>th</sup> and 5<sup>th</sup> years.
- 5. Raw materials will be sourced locally and market for the product is readily available.
- 6. Staff and labour cost will increase by 10% yearly.
- 7. Prices and unit costs are assumed unchanged in the five years of projection.
- 8. The valuation currency used is Naira.

#### 4.2 ACCOUNTING /FINANCIAL ANALYSIS

#### 4.2.1 NET PROFIT

The projected Annual Trading Profit and Loss Account is proposed to make the following Net Profit after tax during the corresponding projected periods – all things being equal.

#### 4.2.2 NET PRESENT VALUE (NPV)

NPV is one of the four methods of discounted cash flows techniques which state that money that is immediately available for use, has a greater value than same amount receivables in future date.

Using this method however, all net cash inflows will be discounted to present value using the estimated interest rate of 60% discount factor. At 12% discount factor the project produced a positive NPV NGN 9,991,653

#### 4.2.3 INTERNAL RATE OF RETURN (IRR)

This is the discount rate which gives zero NPV or the rate which equates the present value of cash inflows with present value of cash outflows of the project.



The cash flow of this project was discounted systematically until the NPV of the project finally become zero. The project produces the **IRR** of **47%**. Thus, the project accepted as being viable. This is because **IRR** is more than the cost of capital.

#### 4.2.4 ACCOUNTING RATE OF RETURN (ARR)

ARR uses accounting information as revealed by financial statements (Income Statement) to measure profitability of the project under consideration. The forecast **ARR** of the project is **82%**.

#### 4.2.5 PROFITABILITY INDEX (PI)

This is the present value of future cash flows over the present value of cash outlays. The project PI further confirm the viability of the project, because as the rules of the accepting and rejecting hold, a project should be accepted if the PI is equal or greater than one (1). Consequently, the PI of this project is 1.72 and thus recommended as being viable to be accepted for financing

#### 4.2.6 PAYBACK PERIOD

The payback period of any project is the length of time it would take the business investors to recover the capital invested in a project in spite of asset replacement. For this particular project the capital investment is expected to be fully recovered in about 1 year and 9 months.



## APPENDIX I TOTAL PROJECT COST

S/N	DESCRIPTION	QTY	UNIT COST	TOTAL
	LAND & BUILDING			
1	Factory rentage	1	400,000	400,000
	Sub total		400,000	400,000
	PLANT & MACHINERY			
2	Syrup Tank	1	200,000	200,000
3	Heating vessels	1	320,000	320,000
4	Nylon net	1	200,000	200,000
5	Plastic vats	1	400,000	400,000
6	Cross flow drier	1	400,000	400,000
7	Impulse sealer	1	12,400	12,400
	Sub total		1,532,400	1,532,400
	UTILITY EQUIPMENT			
8	Industrial Borehole with overhead	1	200,000	200,000
	tanks			
9	Generating set	1	280,000	280,000
	Sub total	2	480,000	480,000
	Total capital cost		2,412,400	2,412,400
	Working capital		800,000	800,000
	10% contingencies & miscellaneous		321,240	321,240
	Total project cost		3,533,640	3,533,640



## APPENDIX II ESTIMATION OF WORKING CAPITAL REQUIREMENT

N'

Year of Commercial Operation	2 weeks
% Capacity Utilization (Inventory)	60%
1 week stock of raw material	350 <b>,000</b>
1 Day stock of finished products	90,000
Work in Progress	40 <b>,000</b>
Bank/ Cash (5% sales of the products)	79 <b>,000</b>
Working capital	559,000

## APPENDIX III FINANCING PLAN

H

DESCRIPTION	EXISTING	PROPOSED	TOTAL
Equity	533,640		533,640
Term loan from	-	3,000,000	3,000,000
Total project cost	533,640	3,000,000	3,533,640
% Contribution	15%	75%	100%

#### **APPENDIX IV**

#### **TERM LOAN REPAYMENT SCHEDULE**

LOAN AMOUNT: 3,000,000 (Three Million Naira)
TYPE: ANY LOCAL AVAILABLE SME FUND

INTEREST RATE USED: 12%

REPAYMENT: 5 YEARS EQUAL INSTALLMENT (Annually)

YEAR	OPENING REPAYMEN		INTEREST	TOTAL YEAR	
	BALANCE		DUE	INTEREST	
1	3,000,000	600,000	360,000	960,000	
2	2,400,000	600,000	288,000	888,000	
3	1,800,000	600,000	216,000	816,000	
4	1,200,000	600,000	144,000	744,000	
5	600,000	600,000	72,000	672,000	
Total		3,000,000	1,080,000	4,080,000	



# $\label{eq:appendix} \textbf{APPENDIX V}$ $\textbf{FORECAST STAFFING SCHEDULE} \ (\textbf{1}^{\textbf{ST}} \ \textbf{OPERATIONAL YEAR})$

#### N'ooo

POSITION	No	Unit Scale	Scale/ Month	Scale / Year
DIRECT LABOUR				
Factory Manager	1	60	60	720
Semi skilled labour	2	30	60	720
Sub total	3	90	120	1,440
INDIRECT LABOUR				
Accounts/ Admin	1	50	50	600
Marketing Officer	1	50	50	600
Sub total	2	100	100	1,200
Total on staff (1 <sup>st</sup> year)	5	190	220	2,640

## APPENDIX VI ESTIMATE OF ANNUAL DEPRECIATION ALLOWANCE

N'

ITEMS	INITIAL VALUE	DEPRECIATION (20%)
Machinery and Equipments	1,532,400	306,480
Utility Equipments	480,000	96,000
TOTAL	2,012,400	402,480

# APPENDIX VII ESTIMATE OF ADMINISTRATIVE / OVERHEAD EXPENSES N'000

COST ITEM	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Selling % distribution	520	680	720	850	920
Utilities (power & water)	386.0	418.0	436.0	464.0	516.0
Traveling & communication	100.0	90.0	100.0	80.0	800.0
P.R and Miscellaneous	151	164.0	178.0	184.0	240.0
Diesel / Fuel	925.0	940.0	975.0	1080.0	1080.0
TOTAL	2,082	2,292	2,409	2,658	3,556



## APPENDIX VIII ESTIMATION OF PRODUCTION AND OPERATION COSTS

## (a) Direct materials, supplies and costs

Cost Item	Units	@	Qty/	Pdn cost/	Pdn cost/	Pdn
			day	day	mth	cost/yr
Direct Costs						
Fruits	Kgs	0.3	16.03	4.81	125.0	1,500
Sugar syrup	Itrs/ kgs	1.1	0.80	0.88	22.9	275
Citric acid	Ltrs	36	0.32	11	300.0	3,600
Packing material	Kgs	0.5	48.08	24	625.0	7,500
Sub-total				41	1,072.92	12,875

# APPENDIX IX ESTIMATION OF RAW MATERIAL/PRODUCTION COST AND SALES

Year of Commercial Production	Year 1	Year 2	Year 3	Year 4	Year 5
% Capacity Utilization	60%	70%	80%	90%	90%
1. Output					
Fresh dried fruit	31,200	34,320	37,752	41,527.2	41,527.2
Total output	31,200	34,320	37,752	41,527.2	41,527.2
2. Cost of Production	N'	N'	N'	N'	N'
Fresh dried fruit @ N110/ unit	3,432,000	3,775,200	4,152,720	4,567,992	4,567,992
Total cost of production	3,432,000	3,775,200	4,152,720	4,567,992	4,567,992
3. <u>SALES</u>					
Fresh dried fruit @ N400/ unit	12,480,000	13,728,000	15,101,000	16,611,000	16,611,000
TOTAL SALES/ TURNOVER	12,480,000	13,728,000	15,101,000	16,611,000	16,611,000



APPENDIX X
FORECAST INCOME STATEMENT (PROFIT & LOSS ACCOUNT)
N'000

Year of commercial operation	Year 1	Year 2	Year 3	Year 4	Year 5
% Capacity Utilization	60%	70%	80%	90%	90%
1. SALES	N'000	N'000	N'000	N'000	N'000
Gross Sales	12,480	13,728	15,101	16,611	16,611
VAT @ 5%	624	686.4	755.05	830.55	830.55
Net Revenue	11,856	13,042	14,346	15,780	15,780
2. OPERATION COST					
Cost of Raw materials consumed	3,432	3,775	4,153	4,568	4,568
Staff and labour	2,640	2,772	2,911	3,056	3,056
Admin. & Overhead Expenses	2,082	2,292	2,409	2,658	3,556
Depreciation	402	402	402	402	402
Total Operating Cost	8,556	9,241	9,875	10,684	11,582
3. OTHER COSTS					
Interest on Term Loan (12%)	360	288	216	144	72
Loan Repayment	600	600	600	600	600
Total (Other Costs)	9,516	10,129	10,691	11,428	12,254
Profit Before Tax	2,340	2,913	3,655	4,352	3,526
Tax @ 20%	468	582.52	730.99	870.49	705.29
Profit after tax (NET PROFIT)	1,872	2,330	2,924	3,482	3,821
% Return on Sales	0.150	0.169	0.1936	0.210	0.170
% Return on Equity	3.505	4.363	5.476	6.521	5.283
% Return on Investment	0.529	0.659	0.827	0.985	0.798



APPENDIX XI
FORECAST HIGH RATE AND LOW RATE COMPUTATION

Year	C/F	DF 12%	NPV	
	N'		N'	
0	(3,533,000)	1		
1	1,872,000	0.893	1,671,696	
2	2,330,000	0.797	1,857,010	
3	2,924,000	0.712	2,081,888	
4	3,482,000	0.636	2,214,552	
5	3,821,000	0.567	2,166,507	
<b>Total Profit</b>	14,429,000		9,991,653	
Average Profit	2,885,800			

Year	C/F	DF 60%	NPV	
	N'		N'	
0	(3,533,000)	1		
1	1,872,000	0.6250	1,170,000	
2	2,330,000	0.3906	910,098	
3	2,924,000	0.2441	713,748.4	
4	3,482,000	0.1526	531,353.2	
5	3,821,000	0.0954	364,523.4	
<b>Total Profit</b>	14,429,000		3,689,723	
Average Profit	2,885,800			



## APPENDIX XII FORECAST IRR AND ARR COMPUTATION

$$IRR = a + (A)*(b-a)$$

A+B

Where

a = 12%

b= 60%

A = 9,991,653

B= 3,689,723

9,991,653 + 3,689,723

12%+ 35.2

47%

ARR = <u>Estimated Average Profit</u>\* 100

Estimated initial investment

$$ARR = 2,885,800*100$$

3,533,000

82%



## APPENDIX XVI CASH FLOW PROJECTION

Year of Comm. Production	Year o	Year 1	Year 2	Year 3	Year 4	Year 5
% Capacity Utilization		60%	70%	80%	90%	90%
A) CASH RECEIPTS	N'	N'	N'	N'	N'	N'
Equity Capital	533,640	-	-	-	-	-
Term Loan	3,000,000	-	-	-	-	-
Gross Revenue	-	11,856,000	13,042,000	14,346,000	15,780,000	15,780,000
Total Receipts	3,533,640	11,856,000	13,042,000	14,346,000	15,780,000	15,780,000
3) CASH PAYMENTS						
Capital Payment						
Machinery & Equipments	1,532,400	-	-	-	-	-
Utility Equipment	480,000	-	-	-	-	-
TOTAL	2,012,400	-	-	-	-	-
(ii) Operating Expenses						
Depreciation	-	402,000	402,000	402,000	402,000	402,000
Change in working capital	800,000	8,154,000	8,839,000	9,473,000	10,282,000	11,180,000
Sub total	800,000	8,556,000	9,241,000	9,875,000	10,684,000	11,582,000
(iii) Financial Expenses						
Repayment of Term Loan	-	600,000	600,000	600,000	600,000	600,000
Interest on Term Loan	-	360,000	288,000	216,000	144,000	72,000
Value Added Tax	-	624,000	686,400	755,050	830,550	830,550
Corporate Tax	-	468,000	582,520	730,990	870,490	705,290
Sub total	-	2,052,000	2,156,920	2,302,040	2,445,040	2,207,840
Total cash payment (ii)-(iii)	800,000	6,504,000	7,084,080	7,572,960	8,238,960	9,374,160
Net cash flow c/f	800,000	6,504,000	7,084,080	7,572,960	8,238,960	9,374,160



## APPENDIX XVII BALANCE SHEET PROJECTION

Year of comm. Operation	Year o	Year 1	Year 2	Year 3	Year 4	Year 5
<u>ASSETS</u>	N'000	N'000	N'ooo	N'000	N'000	N'000
(i) <u>Fixed assets</u>						
Machinery and Equipments	1,532,400	-	-	-	-	-
Utility equipment	480,000	-	-	-	-	-
Value at Acquisition	-	2,012,400	2,012,400	2,012,400	2,012,400	2,012,400
Less Cumulated Depreciation	-	402,480	804,960	1,207,440	1,609,920	2,012,400
Net fixed assets	2,012,400	1,609,920	1,207,440	804,960	402,480	0
(ii)Current Assets/ liability						
Stock of Raw Materials	2,800,000	4,734,696	7,291,689	8,982,131	9,300,976	10,093,189
Debtors /prepayment	-	2,453,000	3,098,000	4,308,000	5,139,000	6,653,000
Bank and Cash Balances	3,517,920	5,150,024	6,160,031	7,170,539	8,180,674	9,180,741
Creditor / accruals	-	(8,074,000)	(10,039,000)	(12,947,000)	(14,013,000)	(16,785,000)
Company Tax	-	(468,000)	(582,520)	(730,990)	(870,490)	(705,290)
Net current assets		3,795,720	5,928,200	6,782,680	7,737,160	8,436,640
TOTAL NET ASSETS	3,533,640	5,405,640	7,135,640	7,587,640	8,139,640	8,436,640
(ii) <u>FINANCED BY</u>						
Equity Capital	533,640	533,640	533,640	533,640	533,640	533,640
P&L	-	1,872,000	2,330,000	2,924,000	3,482,000	3,821,000
Retained Profit	-	-	1,872,000	2,330,000	2,924,000	3,482,000
SHAREHOLDERS FUND	533,640	2,405,640	4,735,640	5,787,640	6,939,640	7,836,640
Long Term Loan	3,000,000	3,000,000	2,400,000	1,800,000	1,200,000	600,000
TOTAL EQUITY & LIABILITY	3,533,640	5,405,640	7,135,640	7,587,640	8,139,640	8,436,640

