PREFEASIBILITY STUDY
ON SETTING UP RECYCLING PLASTICS UNIT IN NIGERIA

DEVELOPED BY
STARTUP BUSINESS FOUNDATION

STARTUP
BUSINESS FOUNDATION

DISCLAIMER

ACKNOWLEDGMENT

Startup Business Foundation is thankful to all organizations and individuals who have helped in several ways in preparation of this prefeasibility study.

We also wish to extend our gratitude to all those who reviewed the content and provided valuable inputs for improving the quality, coherence, and content presentation of this prefeasibility study.

ABOUT THIS REPORT

This prefeasibility study is designed to provide potential and startups entrepreneurs' valuable information on setting up plastic recycling business in the manufacturing 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.

The plastic recycling business has over 80% local content in terms of availability of raw material, equipment and machinery, manpower and other requirements.

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.

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.

TABLE OF CONTENT

APPENIDIES

PART I
EXECUTIVE SUMMARY

This particular prefeasibility study is for setting up plastic recycling and marketing industry in most suitable part of Nigeria.

This manufacturing process of plastic recycling refers to the process of recovering waste or scrap plastic and reprocessing it into useful products such as Ladies shoes, Soles, Front heels, Hind Heels, Sandals etc.

There is high demand for products due to the growing demand for Plastic products, as a result of low cost and durability in relation to usage. This can said to be lucrative venture but requires good skills and expertise in the plastic manufacturing industry and strategic marketing concepts.

The setup of the factory could be done in any part of country given the readily availability of the raw material (non biodegradable plastics). Nevertheless, the entrepreneur should consider parameters that could low cost of production like power supply & skilled labour.

The production capacity of the plant is based on 36,400 plastic products per month which translates into 436,800 products per year at 60% capacity utilization.

1.1 SUMMARY OF TOTAL PROJECT COST

S/N	DESCRIPTION	COST INCURRED	COST TO BE INCURRED	TOTAL
1	Land & building	-	600,000	600,000
2	Machinery & equipment	-	5,050,000	5,525,000
3	Utility equipment	-	1,850,000	1,850,000
4	Office equipment	-	350,000	350,000
5	Vehicle	-	2,800,000	2,800,000
	Total Cost of capital	-	**10,650,000**	**11,125,000**
6	Working capital	-	1,500,000	1,500,000
7	10% Contingencies & preliminary expenses	-	1,262,500	1,262,500
	Total project cost	-	**13,412,500**	**13,887,500**

1.2 FINANCIAL ACCOUNTING RATIOS ANALYSIS

PERFORMANCE RATIOS AVERAGES

(a) Return on Sales =17%
(b) Return on Equity =192%
(c) Return on Investment =82%
(d) Positive NPV = ₦40,235,053
(e) IRR =47%
(f) ARR =81%
(g) Payback Period = 1 year and 5 months

PART II
MARKET ANALYSIS

2.1 INTRODUCTION

Plastic is playing a huge role in our lives from usage as plastic bottles to toothbrush, mug, bucket, tub, containers, polybag, and many more. The usage of plastic has kept on rising years after years and now time has come that we cannot live without them. Plastic is a known non-biodegradable substance which means that it is not possible to break it through natural means. Similarly, plastic is a toxic substance because when it mixes in the atmosphere it causes pollution. Scientists are quite worried about the rise in plastic waste as they are unable to decompose them in comparison to the waste generation.

2.2 MARKET AREA ANALYSIS

Markets and uses for recycled plastics are rapidly expanding. Plastic containers are being collected at the curb for recycling in over 500 communities in different parts of Nigeria, representing more than 4 million households. Demand for recycled plastic will continue to expand and new markets will develop as technologies permit the efficient segregation and reprocessing of high-purity resins. Improved quality of resins, environmental issues and higher prices for virgin resin will contribute to growth.

2.3 INDUSTRY ANALYSIS

The plastics industry has developed considerably since the invention of various routes for the production of polymers from petrochemical sources. Plastics have substantial benefits in terms of their low weight, durability and lower cost relative to many other material types. There is a growing demand for Plastic products across the country. Crushed materials of plastics can also be sold to other big companies in form of raw materials. A major portion of plastic produced each year is used to make disposable items of packaging or other short-lived products that are discarded within a year of manufacture.

2.4 TARGET MARKET ANALYSIS

The market for these products is not limited to any segment of the society. However, the products usage can categorized into domestic, commercial and industrial purposes. Therefore, the enterprise should conduct market research to analysis the consumers demand in the given environment to ascertain the area of production concentrations.

Similarly, there are some major players in the plastic manufacturing industry, but good business model such as targeted production, designs and packaging with strategic marketing concepts, the enterprises will be able to create considerable market niche.

PART III

3.0 TECHNICAL ANALYSIS

3.1 PRODUCT DESCRIPTION

Plastic recycling refers to the process of recovering waste or scrap plastic and reprocessing it into useful product. Due to the fact that plastic is non-biodegradable, it is essential that it is recycled as part of the global efforts to reducing plastic and other solid waste in the environment. Similarly, recycling is one of the most important actions currently available to reduce these impacts and represents one of the most dynamic areas in the plastics industry today. Recycling provides opportunities to reduce oil usage, carbon dioxide emissions and the quantities of waste requiring disposal.

3.2 PROJECT LOCATION

This project can be sited in any part of Nigeria. This is because non biogradable plastic containers and sachets are littered everywhere in different cities and rural areas; therefore the project can be sited in any part of the country. The major consideration for setting up plastic recycling project is constant supply of electricity in the area.

3.3 PRODUCTION CAPACITY

The plant has an installed daily production capacity of 500 Sealing Wax assumed to be 60% production capacity, working 312 days annually.

3.4 PRODUCTION PROCESS

The production process involves cleaning waste plastic, sorting plastics according to their grades, cutting to small pieces, extruding or crushing the plastics to get required sizes of granules. Chemicals are mixed with the crushed plastic to reinstate its originality.
The mixture is then put into a boiler, melted before transfer into the injection machine that sends it to the molding machine. The finished product is removed from the molds, taken for trimming and packed.

3.5 RAW MATERIALS

The Recycling materials (plastic waste) will be picks up by road hustlers from different locations and delivers to central collection centre (recycling yard).

3.6 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 (BOI), International Finance Corporation, 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. The Machineries, Equipments and Utility Equipment have uniform depreciation of 20%.
3. Production costs assumed 312 days per year with a daily capacity of 500 Sealing Wax assumed to be 60% production capacity.
4. The proposed capacity utilization are 60% in the first year of commercial production, 70%, 80% in the 2nd and 3rd year respectively and 90% in the 4th and 5th years.
5. Raw materials will be sourced locally and Market for the product is readily available.
6. Staff and labour cost will increase by 5% 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 40,235,053**

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 81%.

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.

APPENDIX I
TOTAL PROJECT COST

S/N	DESCRIPTION	QTY	UNIT PRICE	AMOUNT
	LAND & BUILDING			
1	Renting of office space	1	600,000	600,000
	Sub total	**1**	**600,000**	**600,000**
	MACHINERY & EQUIPMENT			
2	Weighing scale	1	25,000	25,000
3	Molding machine	1	1,500,000	1,500,000
4	Injection machine	1	1,250,000	1,250,000
5	Boiler	1	750,000	750,000
6	Crushing machine	1	1,500,000	1,500,000
7	Hand tools	20	25,000	500,000
	Sub total		**5,050,000**	**5,525,000**
	UTILITY EQUIPMENT			
8	Generating set	1	1,250,000	1,250,000
9	Industrial Borehole	1	600,000	600,000
	Sub total		**1,850,000**	**1,850,000**
	OFFICE EQUIPMENT			
10	Computer system & printer	1	150,000	150,000
11	Furniture & fittings	set	200,000	200,000
	Sub total		**350,000**	**350,000**
	VEHICLE			
12	4 tons truck	1	2,800,000	2,800,000
	Sub total		**2,800,000**	**2,800,000**
	Total Cost of capital		**10,650,000**	**11,125,000**
13	Working capital		1,500,000	1,500,000
14	10% Contingencies & preliminary expenses		1,262,500	1,262,500
	Total project cost		**13,412,500**	**13,887,500**

APPENDIX II
ESTIMATION OF WORKING CAPITAL REQUIREMENT

N'000

Year of Commercial Operation	2 weeks	Year 2	Year 3	Year 4	Year 5
% Capacity Utilization (Inventory)	60%	70%	80%	90%	90%
1 week stock of raw material	1,150	8,194	11,713	15,530	15,530
1 Day stock of finished products	300	3,443	4,887	5,376	5,376
Work in Progress	50	1,071	1,098	1,169	1,169
Bank/ Cash (5% sales of the products)	-	2,287	2,516	2,768	2,768
Working capital	**1,500**	**11,248**	**13,192**	**15,419**	**15,419**

APPENDIX III
FINANCING PLAN

DESCRIPTION	EXISTING	PROPOSED	TOTAL
Equity	5,887,500		5,887,500
Term loan from	-	8,0000,000	8,000,000
Total project cost	**5,887,500**	**8,000,000**	**13,887,500**
% Contribution	**13.5%**	**86.5%**	**100%**

APPENDIX IV
TERM LOAN REPAYMENT SCHEDULE

LOAN AMOUNT: 8,000,000 (Eight Million Naira)
TYPE : ANY LOCAL AVAILABLE SME FUND
INTEREST RATE USED: 12%
REPAYMENT: 5 YEARS EQUAL INSTALLMENT (Annually)

YEAR	OPENING BALANCE	REPAYMENT	INTEREST DUE	TOTAL YEAR INTEREST
1	8,000,000	1,600,000	960,000	2,560,000
2	6,400,000	1,600,000	768,000	2,368,000
3	4,800,000	1,600,000	576,000	2,176,000
4	3,200,000	1,600,000	384,000	1,984,000
5	1,600,000	1,600,000	192,000	1,792,000
Total		**8,000,000**	**2,880,000**	**10,880,000**

APPENDIX V
FORECAST STAFFING SCHEDULE (1ST OPERATIONAL YEAR)
N'000

POSITION	No	Unit Scale	Scale/ Month	Scale / Year
DIRECT LABOUR				
Factory Manager	1	80	80	960
Production Manager	1	60	60	720
Unskilled labour	8	30	240	2,880
Sub total	**10**	**90**	**120**	**4,560**
INDIRECT LABOUR				
Accounts/ Admin	1	50	50	600
Marketing Officer	2	40	80	960
Driver	1	40	40	480
Sub total	**4**	**130**	**170**	**2,040**
Total on staff (1st year)	**14**	**220**	**290**	**6,600**

APPENDIX VI
ESTIMATE OF ANNUAL DEPRECIATION ALLOWANCE
N'

ITEMS	INITIAL VALUE	DEPRECIATION (20%)
Machinery & equipment	5,525,000	1,105,000
Utility Equipments	1,850,000	370,000
Office equipment	350,000	70,000
Vehicles	2,800,000	560,000
TOTAL	**10,525,000**	**2,105,000**

APPENDIX VII
ESTIMATE OF ADMINISTRATIVE / OVERHEAD EXPENSES
N'000

COST ITEM	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Selling and Distribution	1,800	2,180	2,560	3,016	3,016
Fuel / Diesel	3,800	4,680	5,560	6,616	6,616
Repairs & Servicing	1,800	1,980	2,160	2,376	2,376
Packaging materials	1,800	2,080	3,360	3,696	3,696
TOTAL	**9,200**	**10,920**	**12,640**	**14,704**	**14,704**

APPENDIX VIII

ESTIMATION OF PRODUCTION AND OPERATION COST

Cost Item	Units	@/ day	Qty/ day	Prod. cost/ day	Prod. Cost/ month	Prod. Cost/ year
Plastics/scrap	tones	75,000	1	75,000	1,950,000	23,400,000
Chemicals (PVC/ DBP)	Ltrs	150	20	3,000	78,000	936,000
Sub-total		**75,150**		**78,000**	**2,028,000**	**24,336,000**

APPENDIX IX

FORECAST OF MANUFACTURING ACCOUNT

Item	Qty/ day	Qty/ yr	@	Prod. Cost/year	Unit price	Total revenue
Ladies shoes	200	62,400	60	4,273,200	150	28,080,000
Soles	200	62,400	60	3,744,000	150	28,080,000
Front heels	500	156,000	60	9,360,000	150	23,400,000
Hind Heels	300	93,600	60	5,616,000	90	8,424,000
Sandals	200	62,400	60	3,744,000	150	18,720,000
Sub total	**1,400**	**436,800**	**300**	**26,737,200**	**1,440**	**106,704,000**

APPENDIX X

FORECAST INCOME STATEMENT (PROFIT & LOSS ACCOUNT)

Year of commercial operation	Year 1	Year 2	Year 3	Year 4	Year 5
% Capacity Utilization	**60%**	**70%**	**80%**	**90%**	**90%**
1. SALES	**N'**	**N'**	**N'**	**N'**	**N'**
Gross Sales	59,904,000	65,894,400	71,884,800	79,073,280	79,073,280
VAT @ 5%	2,995,200	3,294,720	3,594,240	3,953,664	3,953,664
Net Revenue	**56,908,800**	**62,599,680**	**68,290,560**	**75,119,616**	**75,119,616**
2. OPERATION COST					
Cost of Raw materials consumed	26,737,200	29,410,920	32,084,640	35,293,104	35,293,104
Staff and labour	6,600,000	7,260,000	7,986,000	8,785,000	8,785,000
Admin. & Overhead Expenses	9,200,000	10,920,000	12,640,000	14,704,000	14,704,000
Depreciation	2,105,000	2,105,000	2,105,000	2,105,000	2,105,000
Total Operating Cost	44,642,200	49,695,920	54,815,640	60,887,104	60,887,104
3. OTHER COSTS					
Interest on Term Loan (12%)	960,000	768,000	576,000	384,000	192,000
Loan Repayment	1,60,000	1,60,000	1,60,000	1,60,000	1,60,000
Total (Other Costs)	45,602,200	50,463,920	55,391,640	61,271,104	61,079,104
Profit Before Tax	11,306,600	12,135,760	12,898,920	13,848,512	14,040,512
Corporate Tax (12%)	1,356,792	1,456,291.2	1,547,870.4	1,661,821.44	1,684,861.44
Profit after tax (NET PROFIT)	**9,949,808**	**10,679,469**	**11,351,050**	**12,186,691**	**12,355,651**
% Return on Sales	0.18	0.17	0.17	0.17	0.17
% Return on Equity	1.69	1.81	1.93	2.07	2.10
% Return on Investment	0.72	0.77	0.82	0.88	0.89

APPENDIX XI

FORECAST HIGH RATE AND LOW RATE COMPUTATION

Year	C/F	DF 12%	NPV
	N'		N'
0	(13,887,500)	1	(13,887,500)
1	9,949,808	0.893	8885178.544
2	10,679,469	0.797	8511536.793
3	11,351,050	0.712	8081947.6
4	12,186,691	0.636	7750735.476
5	12,355,651	0.567	7005654.117
Total Profit	**56,522,669**		**40,235,053**
Average Profit	**11,304,533.8**		

Year	C/F	DF 60%	NPV
	N'		N'
0	(13,887,500)	1	(13,887,500)
1	9,949,808	0.625	6218630
2	10,679,469	0.3906	4171400.591
3	11,351,050	0.2441	2770791.305
4	12,186,691	0.1526	1859689.047
5	12,355,651	0.0954	1178729.105
Total Profit	**56,522,669**		**16,199,240**
Average Profit	**11,304,533.8**		

APPENDIX XII
FORECAST IRR AND ARR COMPUTATION

$$IRR = a + \frac{(A)}{A+B} * (b-a)$$

Where

a = 12%

b= 60%

A = 40,235,053

B= 16,199,240

$$12\% + \frac{40,235,053}{40,235,053 + 16,199,240} (60-12)$$

12% + 34.4

46%

$$ARR = \frac{\text{Estimated Average Profit}}{\text{Estimated initial investment}} * 100$$

$$ARR = \frac{11,304,533.8 * 100}{13,887,500}$$

81%

APPENDIX XIII
CASH FLOW PROJECTION

Year of Comm. Production	Year 0	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	5,887,500	-	-	-	-	-
Term Loan	8,000,000	-	-	-	-	-
Gross Revenue	-	29,281,402	32,888,092	36,542,303	40,834,603	41,299,243
Total Receipts	**13,887,500**	**29,281,402**	**32,888,092**	**36,542,303**	**40,834,603**	**41,299,243**
3) CASH PAYMENTS						
Capital Payment						
Machinery & Equipments	5,525,000	-	-	-	-	-
Utility Equipment	1,850,000	-	-	-	-	-
Office equipments	350,000	-	-	-	-	-
Vehicle	2,800,000	-	-	-	-	-
TOTAL	**10,525,000**	-	-	-	-	-
(ii) Operating Expenses						
Depreciation	-	2,105,000	2,105,000	2,105,000	2,105,000	2,105,000
Change in working capital	3,362,500	42,537,200	47,590,920	52,710,640	58,782,104	58,782,104
Sub total	**3,362,500**	**44,642,200**	**49,695,920**	**54,815,640**	**60,887,104**	**60,887,104**
(iii) Financial Expenses						
Repayment of Term Loan	-	1,60,000	1,60,000	1,60,000	1,60,000	1,60,000
Interest on Term Loan	-	960,000	768,000	576,000	384,000	192,000
Value Added Tax	-	2,995,200	3,294,720	3,594,240	3,953,664	3,953,664
Corporate Tax	-	1,356,792	1,456,291.2	1,547,870.4	1,661,821.44	1,684,861.44
Sub total	-	**5,311,992**	**5,519,011**	**5,718,110**	**5,999,485**	**5,830,525**
Total cash payment (ii)-(iii)	**3,362,500**	**39,330,208**	**44,176,909**	**49,097,530**	**54,887,619**	**55,056,579**
Net cash flow c/f	3,362,500	39,330,208	44,176,909	49,097,530	54,887,619	55,056,579

APPENDIX XIV
BALANCE SHEET PROJECTION

Year of comm. Operation	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
ASSETS	**N'000**	**N'000**	**N'000**	**N'000**	**N'000**	**N'000**
(i) Fixed assets						
Machinery and Equipments	5,525,000	-	-	-	-	-
Utility equipment	1,850,000	-	-	-	-	-
Office Equipment	350,000	-	-	-	-	-
Vehicle	2,800,000	-	-	-	-	-
Value at Acquisition		10,525,000	10,525,000	10,525,000	10,525,000	10,525,000
Less Cumulated Depreciation	-	2,105,000	4,210,000	6,315,000	8,420,000	10,525,000
Net fixed assets	**10,525,000**	**8,420,000**	**6,315,000**	**4,210,000**	**2,105,000**	**0**
(ii)Current Assets/ liability						
Stock of Raw Materials	1,500,000	17,881,202	29,867,485	32,959,521	35,781,921	38,612,816
Debtors /prepayment	-	11,453,000	12,098,000	13,308,000	14,139,000	15,653,000
Bank and Cash Balances	1,862,500	4,150,024	5,160,031	6,170,539	7,180,674	7,180,741
Creditor / accruals	-	(14,074,000)	(16,039,000)	(18,947,000)	(21,013,000)	(23,785,000)
Company Tax	-	1,356,792	1,456,291.2	1,547,870.4	1,661,821.44	1,684,861.44
Net current assets	**3,362,500**	**15,417,308**	**26,601,777**	**28,508,019**	**30,520,241**	**32,029,842**
TOTAL NET ASSETS	**13,887,500**	**23,837,308**	**32,916,777**	**32,718,019**	**32,625,241**	**32,029,842**
(ii) FINANCED BY						
Equity Capital	5,887,500	5,887,500	5,887,500	5,887,500	5,887,500	5,887,500
P&L	-	9,949,808	10,679,469	11,351,050	12,186,691	12,355,651
Retained Profit	-	-	9,949,808	10,679,469	11,351,050	12,186,691
SHAREHOLDERS FUND	**5,887,500**	**15,837,308**	**26,516,777**	**27,918,019**	**29,425,241**	**30,429,842**
Long Term Loan	8,000,000	8,000,000	6,400,000	4,800,000	3,200,000	1,600,000
TOTAL EQUITY & LIABILITY	**13,887,500**	**23,837,308**	**32,916,777**	**32,718,019**	**32,625,241**	**32,029,842**