

**121. PROFILE ON NUTMEG PROCESSING
AND PACKING**

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I. SUMMARY

This profile envisages the establishment of a plant for the processing of nutmeg with a capacity of 150 tonnes per annum.

The present demand for the proposed product is estimated at 2,744 tonnes per annum. The demand is expected to reach at 4,942 tonnes by the year 2022.

The plant will create employment opportunities for 13 persons.

The total investment requirement is estimated at about Birr 3.08 million, out of which Birr 850,000 is required for plant and machinery.

The project is financially viable with an internal rate of return (IRR) of 19 % and a net present value (NPV) of Birr 1.48 million discounted at 8.5%.

II. PRODUCT DESCRIPTION AND APPLICATION

Nutmeg is a spice which is the dried ripe seed of myristica tragrans collected from an evergreen and aromatic nutmeg tree, usually 9 to 20m high. The odour of nutmeg is strong and aromatic and the taste is pungent and slightly bitter.

Nutmeg contains, volatile oil, (5-15%), fat or nutmeg butter, (30-40%), proteins, phytosterin, starch, amyloextrin and colouring matter.

Nutmeg is used mainly as mild spice. The granular product (power) obtained after grinding nutmeg seeds is used for flavouring sweet dishes, pies, some meat and vegetable dishes and beverages.

Medicinally, nutmeg is said to have stimulative, carminative and aphrodisiac properties.

The essential oil of nutmeg finds its application in flavouring baked goods, table sauces, confectionery and milk dishes. Nutmeg butter is employed in the manufacture of soups, perfumes, and ointments.

In this project profile only the powdered nutmeg seed is assumed to be processed and marketed by the envisaged project.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Current Demand

Nutmeg trees, *myristica fragrans*, belong to the family of myristicaceae. They bear fruit after about six years and reach their best production after 20 years. The fruit of the nutmeg tree resembles a small apricot but, unlike apricot, it is not soft and juicy. Underneath the skin of the fruit is a thick, fibrous husk, which contains a dried seed, the nutmeg. A thin layer of lacy material, which produces mace, surrounds the nutmeg. When ripe, the husk splits apart revealing the crimson coloured mace. The husk of the harvested fruit is then broken apart completely and the mace is carefully peeled away from the dried seed.

Nutmegs are generally oval in shape and have a wrinkled surface, which is light brown in colour. They contain 20% to 40% of fixed oil called nutmeg butter and 8% to 15% of essential oil. Generally traded in the whole form, either shelled or unshelled, nutmegs are mainly used, after grinding, in meat products, particularly sausages, soups, baked goods and spice mixes. Nutmeg essential and fixed oils and nutmeg fat called trimyristin, are used in the pharmaceutical, cosmetics, and soap industries, which offer interesting alternatives to the marketing of whole nutmeg. In the pharmaceutical industry, nutmeg extracts can be found in the preparation of balms, syrups etc.

There is no available data which indicates local production of nutmeg. However, Ethiopia imports a substantial quantity of the product annually. In general import is considered as unsatisfied demand therefore the local demand for the product is estimated based on import data. Accordingly, volume and value of the product's annual import is shown in Table 3.1.

Table 3.1
ANNUAL IMPORT OF NUTMEG (KG)

Year	Import	
	Quantity	Value
1997	98	3,422
1998	667	7,758
1999	2,506	10,124
2000	726	15,794
2001	6,643	29,261
2002	5,770	55,720
2003	19,497	196,283
2004	20,002	182,379
2005	20,431	202,587
2006	39,416	311,104

Source; External Trade Statistics

Table 3.1 reveals that import of nutmegs, which amounted to 1090 Kg on average during 1997 - 1999, witnesses a four fold increase to 4,379 Kg during the next three (2000 – 2003) average. The increase in the next three years average (2003 – 2005) was about 4.5 fold. The steady rise in importation of nutmeg has attained a maximum level of 311,104 Kg in 2006 registering an annual average growth rate of 77.6% during the period of analyses.

In order to arrive at the present unsatisfied demand, the following assumptions have been taken.

- The average quantity of import during the last years (2004 – 2006) has been taken as the effective unsatisfied demand for the year 2006.
- Although import during the period under consideration has been increasing at a very high rate, to be on the conservative side the unsatisfied demand is assumed to grow by 15%.

Based on the above assumptions the average level of import during 2004 – 2006 was found to be 26.62 tons. By applying annual average growth rate of 15%, present (2007), unsatisfied demand is estimated at 30.61 tons. This estimated present unsatisfied demand is almost equal to the level of import during the years 2006. Hence, the estimated demand size is on the conservative side.

Apart for the local market nutmeg also have a considerable export potential. Indonesia is the largest world producer and exporter of nutmeg and Grenada is the second largest with a world market share of 32% and 14% respectively. Other exporters include Netherlands, Singapore and Brazil. (See Table 3.2)

Table 3.2

VOLUME AND VALUE OF WORLD NUTMEG EXPORT

Total / Major Exporting Countries	Value (USD 000)	Quantity (TON)	Quantity % Share
World total	70,990	16175	100
Indonesia	22,365	7840	32
Grenada	10,150	1604	14
Netherlands	6,844	1044	10
Singapore	6694	1291	9
Brazil	5461	1125	8
Others	19,476	3,271	27

Source – ITC, calculation based on COMTRADE statistics

The major importers of nutmeg are Germany, USA and Singapore accounting for 14%, 11% and 8% of the total import (See Table 3.3).

Table 3.3
VOLUME AND VALUE OF WORLD NUTMEG IMPORT

Total / Major Exporting Countries	Value (USD 000)	Quantity (TON)	Quantity % Share
World total	86,390	18091	100
Germany	12,342	1740	14
USA	9,682	1806	11
Singapore	7,305	1615	8
Netherlands	6509	1737	8
Belgium	5245	816	6
Others	45,307	10,377	52

Source – ITC, calculation based on COMTRADE statistics.

Over the period 2000-2005, world import of whole nutmeg averaged 16,000 tone yearly with an annual average growth rate of 4% in volume.

Assuming that the 2005 level of global nutmeg import approximate the current demand for the product the present global demand for nutmeg is estimated to be 18,091 tones. Assuming that by maintain product quality and aggressive promotion locally produced nutmeg could capture 15% market share the present demand for locally produced nutmeg is estimated at 2,714 tones.

Accordingly, the total current demand (export plus local unsatisfied) is estimated at 2,744 tones.

2. Projected Demand

In order to be conservative the average growth rate of global import registered during 2000 - 2005 i.e. 4 % which is much lower than the average growth rate registered by import of the product to Ethiopia is used. Accordingly, taking the estimated present demand as a base and applying a 4 % growth rate the projected demand for the nutmeg is shown in Table 3.4.

Table 3.4
PROJECT DEMAND

Year	Projected demand		
	Export	Local	Total
2008	2822	32	2854
2009	2935	33	2968
2010	3052	34	3087
2011	3175	36	3210
2012	3302	37	3339
2013	3434	39	3472
2014	3571	40	3611
2015	3714	42	3756
2016	3862	44	3906
2017	4017	45	4062
2018	4178	47	4225
2019	4345	49	4394
2020	4518	51	4569
2021	4699	53	4752
2022	4887	55	4942

3. Pricing and Distribution

In 2000, the world price for higher grades of nutmeg was approximately US\$ 1,000 per ton which did not ensure adequate returns to exporters. This led to a decision by Grenada and Indonesia the major suppliers to negotiate a marketing arrangement. In 2001, a 'Marketing Agreement' was concluded between the Indonesian producers group, Asosiasi Pala Indonesia or ASPIN, and the Grenada Cooperative Nutmeg Association (GCNA) with the objectives of controlling export volumes of nutmeg and mace to ensure price stability and of setting minimum price levels. Under the agreement, Indonesian and Grenadian producers agreed to the following minimum export prices:

Table 3.5

**MINIMUM EXPORT PRICES AGREED TO BY INDONESIAN AND
GRENADIAN PRODUCERS UNDER 'MARKETING AGREEMENT'**

USD/ton	Indonesia	Grenada
High quality nutmeg	6,800-7,000	6,650
Low quality nutmeg	1,000-1,200	5,850

In order to be competitive and assuming that high quality products will be produced the envisaged plant is recommended to adopt a factory gate price of USD 6,400 (Birr 58,500) per tone.

In principle, the distribution channels for nutmeg are the same as for other spices which, since the 1980's, have seen a shift towards direct sales to end-users by producers; this has also led to a reduced role of major trading/entrepôt centers such as Singapore.

B. PLANT CAPACITY AND PRODUCTION PROGRAM

1. Plant Capacity

The annual production capacity of the proposed project is 150 tons based on 300 working days per year and single shift (8 hrs) per day. The capacity can be increased by extending the number of working hours per day.

2. Production Program

During the first two years of production, full capacity utilization may not be attained. This is because of lack of manufacturing and marketing experiences. Therefore, in the first and second year of production only 70% and 90% of the plant capacity will be utilized. In the third year and then after, full capacity can be attained. The production program of the envisaged project is indicated in Table 3.6.

Table 3.6
PRODUCTION PROGRAM

	Product	Production Year		
		1	2	3-10
	Nutmeg powder (ton)	105	135	150
	Capacity utilization rate (%)	70	90	100

IV. RAW MATERIAL AND INPUTS

A. RAW AND AUXILIARY MATERIALS

The principals raw and auxiliary materials of the project are nutmeg seed and packing materials. For export market the ground nutmeg is packed in a multilayer paper bag of 25 kgs with an inner polylining . For local market, pillow type plastic bags of 100 gm are

convenient for automatic packing and distribution. The annual raw and auxiliary materials requirement and cost is shown in Table 4.1.

Table 4.1
RAW AND AUXILIARY MATERIALS REQUIREMENT AND COST
(AT FULL CAPACITY)

Sr. No.	Raw Material	Unit	Qty	Cost ('000 Birr)
1	Nutmeg fruit	Ton	625	7500
2	Paper bag, with polylinning (25 kg)	Ton	1.05	13.65
3	Plastic bags (pillow tye, 100 gm)	Kg	2250	78.75
	Total			7592.4

B. UTILITIES

Electricity and water are major utilities of the project. Annual utility requirement and its cost is shown in Table 4.2.

Table 4.2
UTILITY REQUIREMENT & COST

Sr. No.	Utility	Unit	Qty	Cost ('000 Birr)
1	Electricity	kWh	120,000	56.88
2	Water	M ³	3500	35
	Total			91.88

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Process Description

Nutmeg fruit is first decorticated and the husk is removed after separating the nutmeg kernel which contains the nutmeg seed and mash. The seed be further conveyed to the grinding unit in which disintegrators and micropalverisers are involved. The powder is then sifted and tested according to standard procedure depending on the mode of marketing. It is then packed and dispatched for sale.

2. Source of Technology

Several machinery suppliers can be requested for their offer. Among them, the following supplier can be contacted.

Food and Biotech Engineers (India) plc..

Website: <http://www.dairyfoodtech.com>

E-mail: foodbiotech@gmail.com

B. ENGINEERING

1. Machinery & Equipment

The list of machinery and equipment is indicated in Table 5.1. The total cost of machinery is estimated at Birr 850,000 out of which Birr 708,000 will be required in foreign currency.

Table 5.1
LIST OF MACHINERY & EQUIPMENT

Sr. No.	Description	No.
1	Decorticating machine	1
2	Disintegrator	1
3	Micropulverizer	1
4	Sifting machine	1
5	Weighing and packing unit	1 set
6	Miscellaneous equipment (handling bins, storage vessels and testing equipment etc.)	1 set

2. Land, Building & Civil Work

The total land requirement of the project is about 1000 m² of which 250 m² is a built-up area. The cost of building is estimated at Birr 375,000. The lease value of land is Birr 80,000 at a rate of 1 Birr/m² per year for 80 years.

3. Location and Site

For its proximity to raw material sources, Laska town is selected as the best location of the proposed project.

VI. MANPOWER & TRAINING REQUIREMENT

A. MANPOWER REQUIREMENT

The list of manpower and annual labour cost is shown in Table 6.1.

Table 6.1
MANPOWER REQUIREMENT & COST

Sr. No.	Description	No.	Monthly Salary (Birr)	Annual Salary (Birr)
1	General manager	1	3,000	36,000
2	Secretary	1	700	8,400
3	Production head	1	2,000	24,000
4	Accountant	1	2,000	24,000
5	Sales man	1	1,000	12,000
6	Operators	2	1,200	14,400
7	Labourers	4	1,200	14,400
8	Guards	2	600	7,200
	Sub total	13	11,700	140,400
	Benefit (25% BS)		2,925	35,100
	Total		14,625	175,500

B. TRAINING REQUIREMENT

On-the-job training shall be carried out by the experts of machinery supplier during plant erection and commissioning. The cost of training is estimated at Birr 25,000.

VII. FINANCIAL ANALYSIS

The financial analysis of the nutmeg processing project is based on the data presented in the previous chapters and the following assumptions:-

Construction period	1 year
Source of finance	30 % equity
	70 % loan
Tax holidays	5 years
Bank interest	8%
Discount cash flow	8.5%
Accounts receivable	30 days
Raw material local	30 days
Work in progress	3 days
Finished products	30 days
Cash in hand	5 days
Accounts payable	30 days

A. TOTAL INITIAL INVESTMENT COST

The total investment cost of the project including working capital is estimated at Birr 3.08 million, of which 39 per cent will be required in foreign currency.

The major breakdown of the total initial investment cost is shown in Table 7.1.

Table 7.1
INITIAL INVESTMENT COST

Sr. No.	Cost Items	Total Cost (‘000 Birr)
1	Land lease value	80.0
2	Building and Civil Work	375.0
3	Plant Machinery and Equipment	850.0
4	Office Furniture and Equipment	100.0
5	Vehicle	325.0
6	Pre-production Expenditure*	290.4
7	Working Capital	1,062.6
	Total Investment cost	3,083.0
	Foreign Share	39

* *N.B Pre-production expenditure includes interest during construction (Birr 140.37 thousand) training (Birr 25 thousand) and Birr 125 thousand costs of registration, licensing and formation of the company including legal fees, commissioning expenses, etc.*

B. PRODUCTION COST

The annual production cost at full operation capacity is estimated at Birr 8.22 million (see Table 7.2). The material and utility cost accounts for 93.44 per cent, while repair and maintenance take 0.61 per cent of the production cost.

Table 7.2**ANNUAL PRODUCTION COST AT FULL CAPACITY ('000 BIRR)**

Items	Cost	%
Raw Material and Inputs	7,592.40	92.33
Utilities	91.88	1.12
Maintenance and repair	50	0.61
Labour direct	84.24	1.02
Factory overheads	28.08	0.34
Administration Costs	56.16	0.68
Total Operating Costs	7,902.76	96.10
Depreciation	208.75	2.54
Cost of Finance	111.98	1.36
Total Production Cost	8,223.49	100

C. FINANCIAL EVALUATION**1. Profitability**

According to the projected income statement, the project will start generating profit in the first year of operation. Important ratios such as profit to total sales, net profit to equity (Return on equity) and net profit plus interest on total investment (return on total investment) show an increasing trend during the life-time of the project.

The income statement and the other indicators of profitability show that the project is viable.

2. Break-even Analysis

The break-even point of the project including cost of finance when it starts to operate at full capacity (year 3) is estimated by using income statement projection.

$$\text{BE} = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable Cost}} = 39 \%$$

3. Pay Back Period

The investment cost and income statement projection are used to project the pay-back period. The project's initial investment will be fully recovered within 6 years.

4. Internal Rate of Return and Net Present Value

Based on the cash flow statement, the calculated IRR of the project is 19 % and the net present value at 8.5% discount rate is Birr 1.48 million.

D. ECONOMIC BENEFITS

The project can create employment for 13 persons. In addition to supply of the domestic needs, the project will generate Birr 1.41 million in terms of tax revenue.