Economic Analysis of Processing Industry with Special Reference to Dry Moringa Powder by Dehydration Method in Pune District of Maharashtra

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ABSTRACT

Background

The fruit and vegetable processing industry play an important role in processing of agricultural products. India ranks third in the production of dried fruits and vegetables. India ranks third in the production of dried fruits and vegetables. The industry is largely decentralized and India has a large number of small-scale units having small capacities up to 250 tons per annum. The commercial production of processed fruits and vegetables is very low in India, contributing only to around 2.2 percent of the total food production.

The growth of this industry will bring immense benefits to the economy, raising agricultural yields, enhancing productivity, creating employment and raising life standards of people across the country, especially in rural areas. The commercial production of processed fruits and vegetables is very low in India, contributing only to around 2.2 percent of the total food production.

Dehydrated fruits and vegetables projects are a new product of value addition series where the shelf life is increased & space for storage is reduced along with easy transportation. Demand for fruits and vegetables are prevalent across length and breadth of the country throughout the year. However, due to specific climatic requirements availability/supply of most of these crops is seasonal. So, preservation through dehydration technique can play an important role. Moringa has been used for centuries due to its medicinal properties and health benefits

Keywords: Dehydrated products, Project cost, Processing, Financial ratio, Breakeven point

INTRODUCTION

India is known as the second largest fruits and vegetables producer in the world followed by China. India accounts for about 15 per cent of the world's vegetable production. In the production of many fruits and vegetables, India is either first or second. However, fruits and vegetables being perishable in nature, get wasted to the tune of 20-30 per cent in the whole supply chain due to poor post-harvest management. On the other hand, only 2 per cent of fruits and vegetables are processed in to value added products and the rest is consumed as fresh. Therefore, processing of fruits and vegetables offers immense scope for wastage minimization and value addition; thus, can generate significant income and employment in Indian agrarian economy.

Agro-processing is now regarded as the sunrise sector of the Indian economy in view of its large potential for growth and likely socio-economic impact specifically on employment and income generation. Some estimates suggest that in developed countries, up to 14 per cent of the total work force is engaged in agro-processing sector directly or indirectly. People generally prefer fresh fruits and vegetables in India due to abundance of seasonal fruits throughout the year available at low price. However, in the recent years, processed foods in the form of canned fruits such as pineapple, Mango slices and pulps, grapes, apple, peaches etc have increased considerably. The uses of fruits in the form of concentrated juice, dry powder, jam and jelly have also increased.

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Fruits and vegetables are seasonal as well as perishable in nature. Through processing (dehydration) vegetables can be used as raw vegetables for cooking. With the help of fresh fruits and vegetables value added products such as pickle, sauce, chips etc. can be prepared. Dehydration of seasonal fruits and vegetables are good bet for long term storage even up to 5 years or beyond if hermitically sealed and can be made available to the consumers during off season. Dehydrated vegetables are used to manufacture instant vegetable noodles, soups, snacks and fast food. Moringa has been used for centuries due to its medicinal properties and health benefits. It also has antifungal, antiviral, antidepressant, and anti-inflammatory properties

Objectives

The research outlook was studied with following points.

1) To examine the procurement management of Moringa
2) To calculate the capital investment of the processing industry
3) To calculate the performance and feasibility parameters of the processing industry

METHODOLOGY

Research Conducted at- Naturals Agro Private Limited, located at Manjari Budruk in Pune district of Maharashtra

The dehydration unit has been selected purposively for working out economics of dehydrated fruits and vegetables with special reference to Moringa Powder. Primary data were collected with the help of personal interaction with the Company Managing Director and Workers. Secondary data were collected from annual report, internet and company records.

Analysis of Data

This is done with the help of various type of mathematical & statistical tools like graph, table, charts & various formulas. The data phased on fixed cost, variable cost, Net Present worth, Breakeven point, Benefit cost ratio and payback period to work out the efficiency and feasibility of processing industries.

RESULT

1. Total capital investment required for processing unit of fruits and vegetables is Rs.51,83,000.
2. The Processing cost of Moringa Powder is Rs 1,162/Kg and its sale price is Rs 2400/Kg.
3. The company has not followed the procurement policy with regard to adoption of contract farming with the vegetable producers.

Methodology

The dehydration unit “Naturals Agro Private Limited” located at Manjari Budruk in Pune district has been selected purposively for working out economics of dehydration of Moringa. Primary data were collected with the help of personal interaction with the Company’s Managing Director and Workers. Secondary data were collected from annual report, internet and company records.

Analytical tools

The collected data were analyzed by using simple statistical techniques such as average, percentage and presented in tabular and graphical methods. Data Analysis is done with mathematical & statistical tools like –

1. Table

2. Formulas

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RESULTS AND DISCUSSION

Dehydrated Products Range

There is wide range of agricultural products which can be dehydrated and marketed locally or internationally. The information on dehydrated products viz; vegetables, from selected unit is given in Table 3.1, Table 3.2 and Table 3.3, respectively.

Table 3.1 Dehydrated Vegetable Products produced in Naturals Agro unit

Spinach Powder	onion powder	Drumstick powder	Spinach Powder
Bottle Gourd Powder	Basil Leaves Powder	Tomato Powder	Methi Powder
Curry leaf Powder	Dry Cococasia	Mint Powder	Beet Powder
Ginger Powder	Garlic Powder	Palak Powder	Moringa Leaves Powder

Table 3.2 Dehydrated Fruit products produced in Naturals Agro unit

Dry Jamun	Dry Pineapple	Awala Candy	Dry Banana
Tamarindus indica Powder	Dry Mango cubes	Amchur Powder	Dry Ber
Jamun beej Powder	Awala Supari	Raw mango Powder	Orange Powder

Table 3.3 Dehydrated Medicinal plant productsproduced in Naturals Agro unit

Lemon Grass Powder	Shikekai Powder	Gulab Powder	Stevia Powder
Lemon Grass, Ginger, Cardamom Mix Powder	Ritha Powder	Awala Powder	Laxmi Taru

Fruits and Vegetables Dehydration Temperature and Moisture level

Table 3.4 Percentage loss of selected fruits and vegetable in processing

Sr. No.	**Fruits and Vegetables**	**Loss (%)**
1.	Dry Jamun	10 to 15
2.	Dry Ambadi	5 to 10
3.	Moringa Powder	3 to 5
4.	Onion Flex	1 to 2
5.	Mango Cubes	to 30

Project Cost

This research suggests a plant with an average capital investment Rs. 51,83,000, with minimum human resource requirement of five people, where at least one manager is mandatory. The average electricity and water costing for processing unit is 3,90,000**.**

Table 3.5 Capital investment

Sr. No.	**Items**	**Rate (Rs)**	**Amount (Rs.)**	**Total Amount (Rs.)**	**Percentage (%)**
1	**Acquisition of Land (2.5 R)**	10,00,000	25,00,000	25,00,000	48%
2	**Water structure**				
	a) Bore well (1)	68,000	68,000	68,000	1%
3	**Construction of building**	-	20,00,000	20,00,000	39%
4	**Machinery and Equipment's**				

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	1.Tray dryer (1)	3,50,000	3,50,000		
	2. Pulverizer (1)	65,000	65,000		
	3. Grader (1)	45,000	45,000		
	4. Packing (2)	2,500	5,000		
	Total			4,65,000	9%
5	**Furniture**	-	1,50,000	1,50,000	3%
6	**Insurance premium rate**	-			

Human Resource Requirements

For running a small processing unit, a single manager is sufficient for managing all the activities which are carried out in processing unit and minimum human resource requirement is as follows:

Table 3.6 Human Resource

Labour	**Numbers**	**Working days/month**	**Salary/Month (Rs.)**	**Annual Salary (Rs.)**
Male (Rs.300)	1	25	7,500	90,000
Female (Rs.250)	4	25	6,250	300,000
Total	**5**			**3,90,000**

For running a small processing unit, a single manager is sufficient for managing all the activities which are carried out in processing unit and minimum human resource requirement is as follows:

Table 3.7 Human Resource

Labour	**Numbers**	**Working days/month**	**Salary/Month (Rs)**	**Annual Salary (Rs)**
Male (Rs.300)	1	25	7,500	90,000
Female (Rs.250)	4	25	6,250	300,000
Total	**5**			**3,90,000**

Electricity and Water Charges

The fruits and vegetables processing unit average electricity and water charges as given below

Table 3.8 Electricity and Water

Particulars	**Amount (Rs.)**
Electricity	1,44,000
Water	60,000
Total	**2,04,000**

About Moringa and Moringa Powder

The dehydrated unit that has been wide range of products which is shown in dehydrated product range. The further research is taken with the special consideration of Moringa Powder**.**

Procurement of Fresh Moringa Leaves in Kg and prices at different time period in (2021-22)

For the calculation of processing cost of dry moringa powder the data of total procurement of fresh moringa made by the company was collected and given in Table 4.9

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Table 3.9 Procurement prices at different time period of Fresh Moringa Leaves

Sr. No.	Month	Procurement (Kg) / Rs.30	Total Price
1.	Aug.	262	7,860
2.	Dec	262	7,860
3.	April	210	6,300
Total		**734**	**22,020**

The Table 4.9, provides the information about the quantity of fresh Moringa procured 262 kg, 262 kg, 210 kg with the price of Rs.30 per kg in the month of august, December and April respectively.

Detail procedure of Dry Moringa leaves –

1. Fresh Moringa leaves

Take fresh green color moringa leaves without any pest and disease on leaves.

2. Stripping the leaves

Strip all the leaflets from the moringa leaf petiole. This can be done directly from the branches if the moringa leaves have not been stripped off the main branch before transportation. At this stage, diseased and damaged leaves are discarded.

3. Washing and Cleaning

Wash leaflets in troughs using clean potable water to remove dirt then Strain water from the Moringa leaves in buckets that have been perforated, spread it on cotton cloth.

4. Drying

Dry in shadow for 2-4 hours.

5. Dehydration

Put leaves on the tray and put trays into dehydrator at 50^{o} c to 55^{o} c for 16 hours.

And check it with every 2-3 hours and turn the leaves.

6. Cooling

After 12 hours remove the trays from dehydrator and cool leaves at room temperature

7. Grinding

Pulverizer is used for making powder form of dry moringa leaves.

8. Weighing and packaging

After making powder form of dry moringa leaves weigh it and pack it.

9. Labelling

Label the packets according to different sizes.

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Flow Chart of Dehydrated Moringa powder

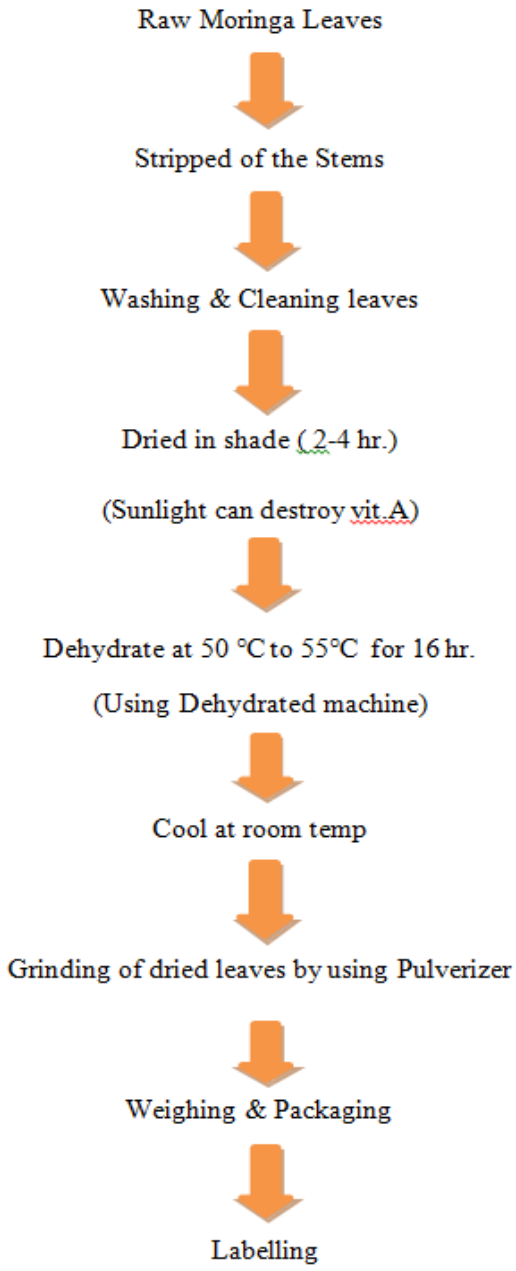

Fig 3.1 Flow chart processing of Dehydrated Moringa Powder

Moringa Powder

Processing Quantity of dry moringa and price of raw moringa mentioned in the table 4.20

Table 3.10 Processing Quantity of moringa powder (2021-22)

Sr. No.	Month	Moringa Leaves (Kg)	Moringa Powder (kg)
1.	Aug.	250	25
2.	Dec	250	25
3.	May	200	20
Total		**700**	**70**

The Table 3.10 provides the information about the quantity of dry moringa leaves powder processed was 25 kg, 25 kg and 20 kg in the month of August, December and May respectively. 250 kg of fresh moringa leaves is required for making 25 kg of dry moringa powder

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Per unit Cost of processing of Dry Moringa Powder

The process of converting raw material into final product having some added values. So that, there is some cost required to process the product. Per unit Cost of processing of Dry moringa powder mentioned in the following table 3.11

Table 3.11 Per unit Cost of processing of Dry Moringa Powder

Sr. No.	Particulars	Amount (Rs.)
a)	**Fixed Cost**	
	Depreciation on Fixed Assets	1862.76
	Interest on fixed capital	10,697.71
	Total fixed cost 70 kg.	12,560.47
	Fixed cost Per kg.	**179.43**
b)	**Variable cost**	
	Raw Material cost (700kg)	21,000
	Wages	6,708
	Electricity Charges	2,476.8
	Water Charges	1,032
	Packaging cost	16,800
	Labelling cost	14,000
	Loss in Processing	1,020
	Interest on working capital (63,036.8) 12%	7,564.42
	Total variable cost for 70 kg	70,601.22
	variable cost per kg.	**1008.59**

The above table shows that fixed cost and variable cost required for processing. Total fixed cost and variable cost required for processing is ₹12,560.47 and ₹70,601.22respectively. The fixed cost and variable cost per kg is ₹ 179.43 and ₹ 1008.59.

Total cost for processing

Total cost for processing of dry moringa powder given in the table 3.12

Table 3.12 Total cost for processing

Sr. no	Cost	Total cost (Rs.)	Cost per kg
1	Fixed cost	12,560.47	179.43
2	Variable cost	70,601.22	1008.59
	Total cost	**83,161.69**	**1,188.02**

Table 3.12, indicates that the total fixed cost of processing of dry moringa powder was Rs. 12,560.47and fixed cost per kg was Rs.179.43. Total Variable cost was Rs. 70,601.22 and Variable cost per kg was Rs. 1008.59.

Income during the year 2021-22

Income during the year 2021-22 is given in table 3.13

Table 3.13 Income during the year

Product Name	Production (Kg)	Cost of Production (Rs./kg.)	Price Realized (Rs./kg)	Total cost (Rs.)	Total Income (Rs.)	Profit (Rs.)
Moringa Powder	70	1,188.02	2400	83,161.4	1,68,000	84,838.6

From table 3.13 it was observed that company gets profit Rs 84,838.6 by sale of 70 kg of dry moringa

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powder. Price per kg of dry moringa powder was Rs.2400 and cost of production was Rs. 1,188.02 hence total cost was also Rs 83,161.4.and total income was Rs 1,68,000.

Benefit Cost Ratio of Moringa Powder

BCR = Gross income / Total cost of production

BCR = 1,68,000/ 83,161.4

BCR = 2.0

Here, we compare the Present worth of Gross income with Present worth of Cost. BCR was more than one, i.e. 2.0 was indicate Project was satisfactory. B:C Ratio indicates the, how much amount of money is received after investing Rs 1/-. For Natural agro project B:C Ratio is 2.0 means, when we investing Rs 1/- then we received Rs 2.0/-

Total profit = Total Contribution – Total fixed cost

= 97,398.7 - 12,560.47

= 84,838.23

Thus, total profit of Moringa powder at Natural Agro Pune in year 2021-22 is ₹ 84,838.23.

Actual sales = Quantity in kg * sales price

= 70 *2400

= 1,68,000

Thus, actual sales of Moringa powder at Natural Agro Pune in year 2021-22 is ₹ 1,68,000.

$$\textbf{Margin of Safety} = \frac{\text{Actual Sales} - \text{BEP at Rs.}}{\text{Actual Sales}} \times 100$$

$$= (1{,}68{,}000 - 21{,}655.98) / 1{,}68{,}000 \times 100$$

$$= \mathbf{1{,}46{,}344.02} / 1{,}68{,}000 \times 100$$

$$= 0.87 \times 100$$

$$= 87\%$$

Thus, Natural Agro Pune have 87% Margin of safety for dry moringa powder product. It indicates that actual profit of the company once it pays for all fixed and variable costs.

CONCLUSION

1. The total procurement of Moringa was 734 kg which cost Rs. 22,020 which was procured in the month of November, March, July (2021-22).
2. Total capital investment required for processing unit of fruits and vegetables is Rs.51,83,000.
3. The Processing cost of Moringa Powder is Rs 1,162/Kg and its sale price is Rs 2400/Kg. Company gets profit of Rs. 1,238/Kg.
4. B:C Ratio of Moringa powder was 2.0.
5. The company has not followed the procurement policy with regard to adoption of contract farming with the vegetable producers.

SUGGESTIONS

1. Company should try to procure maximum quantity of fruits and vegetables from farmers under contract farming in order to make fruits and vegetables available at fixed price of desired qualities at the right time whenever required.
2. Company should try to use generator or solar panel to solve the electricity problems which causes breakdown during operations.

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