Plant Archives Vol. 25, No. 1, 2025 pp. 21-26 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

Journal homepage: http://www.plantarchives.org

DOI Url : https://doi.org/10.51470/PLANTARCHIVES.2025.v25.no.1.004

ECONOMICVIABILITY AND MARKETING EFFICIENCY OF ORGANIC JAGGERY PRODUCTION

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(Date of Receiving-30-06-2024; Date of Acceptance-01-09-2024)

ABSTRACT

Jaggery is experiencing a surge in popularity due to the belief that, it is more nutritious alternative to refined white sugar. Jaggery contains essential micronutrients with remarkable antitoxic and anti-carcinogenic properties. In addition to these benefits, jaggery plays a crucial role in purifying the blood and preventing rheumatic afflictions and bile disorders, making it an effective remedy for conditions like jaundice. With the objective to understand the profitability of organic jaggery production and to identify the efficient marketing channel, the present study was carried out in Bagalkote district of Karnataka which has a significant number of organic sugarcane growers and processors. Primary data was collected from one jaggery processing unit and 20 market intermediaries consisting of 5 wholesalers, 5 retailers and 10 consumers to trace the marketing channels and assess their efficiency for the agricultural year 2022-2023. The results of the analysis revealed that total capital investment in establishing a jaggery production unit was Rs. 33,78,990. To produce one ton of jaggery, total cost was Rs. 35,789 and market price per ton of organic jaggery was Rs. 55,000. Benefit-cost ratio was 1.54 which indicates organic jaggery production was profitable. The break-even output about 165 tons and the time period required to reach break-even quantity of output was 110 days. Marketing efficiency estimated by Acharya's approach was highest in Channel III (119) followed by Channel II (1.90) and Channel I (1.38). Findings of the study calls for necessary measures by concerned departments, organizations and institutions to create awareness and motivate farmers to produce organic jaggery on large scale.

***Key words*:** Organic jaggery, Cost of production, Breakeven analysis, Marketing efficiency, Price spread, Producers share

Introduction

Agricultural is the primary sector of India contributing (18.3%, 2022-23) to national GDP (GoI, 2024 report) and about 65 percent of the population in India are engaged in agriculture and allied activities directly and about 55 percent of the workforce is engaged in agriculture and allied activities. Over the years agriculture has seen lot of development and shifted from traditional to modern practices. This shift has certainly helped in feeding the growing population of the country, but it has also increased the use of inorganic input in the production. Further, modern agricultural practices like synthetic fertilizers and pesticides contribute to environmental pollution and degrade soil fertility. Now the people are again looking for the alternatives to minimize the use of inorganic inputs to minimize the ill effects on environment. Organic farming offers an eco-friendly alternative by using nutrient-rich animal and plant-based resources which enhances soil health, microbial activity and yield stability, while minimizing environmental impact and promoting sustainability (Dhiman, V., 2020).

Jaggery is an essential part of the Indian diet and it is either consumed directly or used to make sweet-based delicacies. Jaggery is commonly called "medicative sugar" due to its use in Ayurveda and its proximity to honey (Hirpara *et al.*, 2020). Jaggery is a traditional, unrefined sugar ranging in colour from golden-yellow to dark brown, produced by concentrating sugarcane juice. It is made in about 25 countries with an estimated annual production of 13 million tonnes. In India, jaggery processing plant are set up in a rural or decentralized sector (Singh *et al*., 2021). In different regions of India, jaggery is being produced with different name such as gud, gul, vellum, jaggery and bella (Nath *et al*., 2015). India is the largest producer of jaggery in the unorganized agro-processing sector, accounting for 55% of global production and around 14.2% of the total sugarcane harvest is used to produce jaggery and khandsari (Rao, P.J. and Sreedevi, P., 2017). It gives employment to about 2.5million rural people (Anwar, 1999).

Jaggery is a rich source of essential minerals, including calcium (40-100 mg), magnesium (70-90 mg), potassium (1056 mg), phosphorus (20-90 mg), sodium (19-30 mg), iron (10-13 mg), manganese (0.2-0.5 mg), zinc (0.2-0.4 mg), copper (0.1-0.9 mg) and chloride (5.3 mg) per 100 grams of jaggery. Furthermore, it contains a range of vital vitamins, such as vitamin A (3.8 mg), vitamin B1 (0.01 mg), vitamin B2 (0.06 mg), vitamin B5 (0.01 mg), vitamin B6 (0.01 mg), vitamin C (7.00 mg), vitamin D2 (6.50 mg) and vitamin E (111.30 mg) per 100 grams of jaggery. Additionally, jaggery provides protein, with 280 mg per 100 grams (Anon. (a), 2020). The abundance of these essential nutrients makes jaggery a potential tool to combat malnutrition and undernutrition, as it can be made available to a wide range of people, helping to improve their overall nutritional intake.Jaggery contains essential micronutrients with remarkable antitoxic and anti-carcinogenic properties and it plays a crucial role in purifying the blood and preventing rheumatic afflictions and bile disorders, making it an effective remedy for conditions like jaundice.

The economic viability of organic jaggery production lies in its growing demand among health-conscious consumers and the increasing awareness of sustainable agricultural practices. As consumers shift towards natural, chemical-free products, organic jaggery has gained market prominence due to its superior nutritional profile and environmental benefits. Although organic farming methods may involve higher initial costs, the premium pricing of organic jaggery and its appeal in both domestic and international markets make it a profitable venture. Additionally, the long-term benefits of soil health and reduced dependency on synthetic inputs contribute to the sustainability and economic feasibility of organic jaggery production. In manufacture of organic jaggery clarificants used were deola, bhendi, semal, castor seed, phalsa, ground nut, soybean, ambadi, tapioca, sukhlai, etc. (Uppal *et al*, 2005). Sugarcane varieties suitable for jaggery production are Co 8371 (Bhima), Co 7219 (Sanjivani), CoM 7125 (Sampada), CoM 88121 (Krishna), Co 8014 (Mahalakshmi), CoC 671, Co 99006 and CoA 92081 (Anon. (b), 2020).

Marketing organic jaggery in India is fraught with several challenges that hinder its widespread adoption. The marketing of jaggery is complex, involving middlemen and Agricultural Market Committees due to the scattered nature of production and consumption areas. One significant issue is the lack of consumer awareness about the health benefits and environmental advantages of organic jaggery, leading to its lower demand. The higher production costs associated with organic farming methods result in a more expensive product, which can be a deterrent for price-sensitive consumers. Additionally, small-scale producers often face difficulties in accessing larger markets, limiting their reach to local or niche segments. The complexity and cost of obtaining organic certification further complicate the process, particularly for small farmers. Moreover, inadequate infrastructure for storage, transportation, and distribution can affect the quality of organic jaggery, increasing the risk of losses. Finally, organic jaggery competes with the more widely available and cheaper conventionally produced jaggery, making it challenging to secure a significant market share. Understanding the roles of producers, middlemen, and market committees is essential for the development of the jaggery industry (Shingate, K., 2015). Top of Form

Bottom of Form

Malkunje *et al.*, (2017) conducted a study in Kolhapur district of Maharashtra to study the economics of organic jaggery production in 2011-12 and revealed that, the per quintal cost of organic jaggery production was Rs. 2768.97. The establishment cost of jaggery production unit was Rs. 8,06,120. The Break-even point for organic jaggery production was 247.68 quintals and Rs. 8,91,646 in physical terms and monitory terms respectively. Similarly results of Deokate *et al.*, (2010) showed that profitability of enterprise depends upon the efficient marketing. The most important two marketing channels were observed in the sale of jaggery *viz*., Channel-I: Producer- Commission agent - Wholesaler - Retailer – consumer and Channel-II: Producer - Co-operative Sangh - Wholesaler - Retailer - consumer. The producer's share in consumer's rupee and marketing efficiency index was

highest in Channel II. With this background, the important questions that emerge are; Is organic jaggery production is economically viable? What are the alternatives available to minimize the price spread in organic jiggery? With all these thoughts, this study was an attempt to estimate the economic viability and marketing efficiency of organic jaggery.

Materials and Methods

A purposive sampling technique was employed to select the study area (Bagalkote district of Karnataka which one of the major sugarcanes growing district) and random sampling design was used for the selection of market intermediaries. Information related to the investment requirements for establishing a jaggery processing unit, cost and return in jaggery processing was collected from one jaggery processing unit. In addition, the data was also collected from 20 market intermediaries consisting of 5 wholesalers, 5 retailers and 10 consumers to trace the marketing channels and assess their efficiency. The primary data was collected from the sample respondents during the month of May 2023 and the data was collected in respect of the production of organic jaggery pertaining to the agricultural year 2022-2023.

Statistical tools:

1. Tabular analysis

The costs involved are categorized as establishment, variable and fixed costs. Establishment cost accounts for the expenditure on rental value of land, civil construction, processing machineries, equipment and license fee, etc. Variable costs refer to the costs incurred on raw materials, additives, clarificants, electricity charges, labour charges, transportation and interest on working capital (7 per cent per annum). Fixed the salary of permanent staff, maintenance cost, depreciation on building and machineries, apportioned establishment cost and interest on fixed investment at 12 per cent is considered.

In case of return, gross return was worked out by multiplying total output of jaggery with its unit price and net returns was calculated by deducting total cost from gross returns. Benefit-cost ratio was obtained by dividing gross income by total cost.

2. Break-even analysis

The break-even analysis was attempted to estimate the level of jaggery production at which the returns are just sufficient to recover the initial investment on processing units. The break-even volume of output was determined with help of the following formula.

$$\text{Break-even output} = \frac{\text{Fixed cost}}{\text{Unit selling price} - \text{Unit variable cost}} \quad (1)$$

Based on break-even output, the number of days a processing unit required to operate for reaching break even output was worked out.

3. Marketing efficiency

Efficiency of the marketing system is normally analyzed using the standard formula developed by Acharya and Agarwal.

$$ME = NPP \div [MC+MM] \quad (2)$$

Where,

ME = Marketing efficiency index

NP_p = Producer's net price

MC = Marketing cost

MM = Marketing margin

$$NPp = GPp-(Cp) \quad (3)$$

Where,

NP_p = Net price received by the producer (Rs./q)

GP_p = Gross price received by the producer (Rs./q)

C_p = Cost incurred by the producer during marketing (Rs./q)

Marketing channels

The marketing channels are the routes consisting of

Table 1: Capital investment in establishing a jaggery processing unit

S. No	Item	No.	Price/unit (Rs.)	Value (Rs.)	%
1	Rental value of land for 15 years (acre)	0.6	15,00,000	9,00,000	26.64
2	Shed	1	5,50,000	5,50,000	16.28
3	License fee	-	-	6.000	0.18
4	Furnace	2	40,000	80,000	2.37
5	Chimney	2	10,000	20,000	0.59
6	Boiling pan (1000 lit)	2	95,000	1,90,000	5.62
7	Conveyer	1	2,00,000	2,00,000	5.92
8	Cane crusher	1	6,80,000	6,80,000	20.12
9	Electric motor	8	25,000	2,00,000	5.92
10	Juice storage tank (1000 lit)	1	1,50,000	1,50,000	4.44
11	Dryer	1	3,00,000	3,00,000	8.88
12	Filtration system	1	55,000	55,000	1.63
13	Bani	2	2,000	4,000	0.12
14	Gori	2	500	1,000	0.03
15	Hutta	4	1,000	4,000	0.12
16	Ash spade	2	370	740	0.02
17	Magi	2	3,000	6,000	0.18
18	Moulds (1 kg)	250	25	6,250	0.18
19	Cube mould (5gm)	20	1,300	26,000	0.77
Total				**33,78,990**	**100**

Table 2: Costs and returns in organic jaggery production.

S. No.	Particulars	Rate/ unit	Per ton		Per annum		% share
			Qty.	Value(Rs.)	Qty.	Value (Rs. in lakh)	
I	**Variable cost**						
1	Sugarcane (t)	3,300	8.33	27,489	3123.75	103.08	76.81
2	Harvesting and transportation (Rs./t)	250	8.33	2,083	3123.75	7.81	5.82
3	Bhendi extract (kg)	40	2.00	80	750.00	0.30	0.22
4	Lime (kg)	25	1.00	25	375.00	0.09	0.07
5	Fuel (t)	300	0.50	150	187.50	0.56	0.42
6	Electricity	-	-	240	-	0.90	0.67
7	Labour charges (mandays)	400	5.25	2,100	1968.75	7.88	5.87
8	Interest on working capital @ 7%	-	-	2,281	-	8.55	6.37
	Total variable cost			**34,448**		**130.74**	**96.25**
II	**Fixed cost**						
1	Salary to permanent staff	-	-	200	-	0.75	0.56
2	Maintenance cost	-	-	67	-	0.25	0.19
3	Depreciation on machinery	-	-	256	-	0.96	0.72
4	Depreciation on building	-	-	73	-	0.28	0.20
5	Apportioned establishment cost per annum	-	-	601	-	2.25	1.68
6	Interest on fixed capital @ 12%	-	-	144	-	0.54	0.40
	Total fixed cost			**1,341**		**5.03**	**3.75**
III	**Total cost**	-	-	**35,789**	-	**135.77**	**100.00**
IV	**Gross return**	**55,000**	**1**	**55,000**	**375**	**206.25**	-
V	**Net return**	-	-	**19,211**	-	**70.48**	-
VI	**Benefit-Cost ratio**	-	-	**1.54**	-	**1.54**	-

various agencies through which the produce moves from producer to the ultimate consumer.

Jaggery after leaving from the processing unit it has to reach the consumer through different pathways. In the present study, efforts were made to find out different marketing channels. Following are the three major channels followed by the jaggery processing units.

Channel I: Producer- Wholesaler- Retailer- Consumer

Channel II: Producer- Retailer- Consumer

Channel III: Producer- Consumer

Price spread

The price spread is the difference between the price paid by the ultimate consumer and the net price received by the producer for an equivalent amount of the product.

Producer's share in consumer rupee

It is the percentage of the net price received by the producer to price paid by the consumer. Higher value of producer's share in consumer rupee indicates more the efficiency of the channel.

Results and Discussion

Investment pattern in establishing a jaggery-processing unit

The information on investment required for establishing a jaggery processing unit is presented in Table 1. Total capital investment was Rs. 33,78,990. Land, cane crusher and shed accounted for 26.64, 20.12 and 16.28 per cent of total capital investment, respectively. Other establishment expenses incurred were furnace, chimney, boiling pan, conveyer, electric motors, juice storage tank, dryer, other handling equipment, moulds including license fee.

Cost and returns in organic jaggery production

Costs and returns in organic jaggery preparation are presented in Table 2. Analysis was carried out on both per ton and per annum basis for better understanding. On an average, processing unit was producing 375 tons per annum by working for about 250 days in a year, which accounts to 1.5 ton/day. To produce one ton of jaggery, the total variable costs was Rs. 34,448 which includes cost incurred on sugarcane (Rs. 27,489), harvesting and

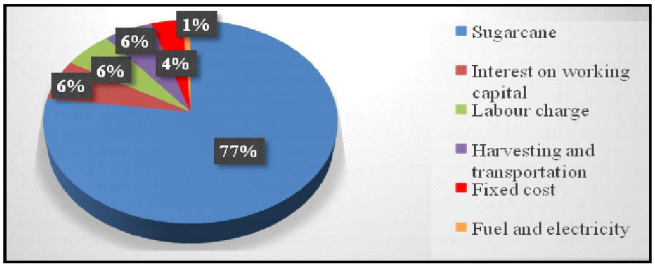

Fig. 1: Share of cost components in organic jaggery production (per ton).

Table 3: Break-even analysis in organic jaggery production.

S.	Particulars	Unit	Value
1	Establishment cost	Rs.	33,78,990
2	Variable cost per ton	Rs.	34,448
3	Price of output per ton	Rs.	55,000
4	Break-even output	t	165
5	Time period for break-even output	Days	110

transportation charge (Rs. 2,083), bhendi extract (Rs. 80), lime (Rs. 25), fuel (Rs. 150), electricity (Rs. 240), labour cost (Rs. 2,100) and interest on working capital (Rs. 2,281). Fixed costs include salary of permanent staff (Rs. 200), maintenance cost (Rs. 67), depreciation on machinery (Rs. 256), depreciation on building (Rs. 73), apportioned establishment cost (Rs. 601) and interest on fixed capital (Rs. 144) which added upto Rs. 1,341. Total cost involved in per ton jaggery production was Rs. 35,789. In the study area, market price per ton of organic jaggery was Rs. 55,000 and hence net return per ton was Rs. 19,211. Benefit-cost ratio was 1.54 indicating for every rupee of investment, organic jaggery producers receive one rupee fifty four paise. Per cent share of each cost componentsas indicated in Table 2 showed that, the main raw material i.e., sugarcane accounted for 77 per cent, followed by interest on working capital (6%), labour charge (6 %), harvesting including transportation (6 %),

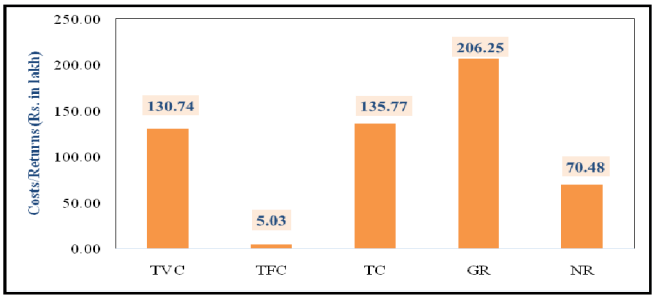

Fig. 2: Cost and returns in organic jaggery production (per annum).

fixed cost (4%) and fuel and electricity (1%) (Fig. 1).

Total variable cost was Rs. 130.74 lakh and fixed cost was Rs. 5.03 lakh for organic jaggery production per annum. Total cost, gross return and net return were Rs. 135.77, Rs. 206.25 and Rs. 70.48 lakh per annum, respectively (Fig. 2) and Benefit-cost ratio was 1.54. Hence, the hypothesis that, production of organic jaggery is profitable was accepted. These results were in line with the findings of Malkunje *et al*., (2017), conducted a study on economics of organic jaggery production in Kolhapur district of Maharashtra in which, the Benefit-cost ratio was positive (1.29).

Break-even analysis in organic jaggery preparation

The result of break-even analysis of organic jaggery

Table 4: Price spread and efficiency of different marketing channels identified in the study area (Rs./qtl).

S. No.	Market functionaries	Channel I(P-W-R-C)		Channel II(P-R-C)		Channel III(P-C)	
		Amt. (Rs.)	Per cent	Amt. (Rs.)	Per cent	Amt. (Rs.)	Per cent
I	**Channel-wise quantity marketed**						
1	Quantity of jaggery transacted (t)	196	52.34	116	30.97	63	16.69
II	**Details of marketing**						
1	**Producer**						
A	Sale price	7,000	-	6,000	-	6,000	-
B	Marketing cost	1,200	28.57	500	17.24	50	100
C	Net Price received	5,800	-	5,500	-	5,950	-
2	**Wholesaler**						
A	Purchase price	7,000	-	-	-	-	-
B	Marketing cost	350	8.33	-	-	-	-
C	Profit margin	850	20.24	-	-	-	-
D	Sale price	8,200	-	-	-	-	-
3	**Retailer**						
A	Purchase price	8,200	-	6,000	-	-	-
B	Marketing cost	775	18.45	1,125	38.79	-	-
C	Profit margin	1,025	24.40	1,275	43.97	-	-
D	Sale price	10,000	-	8,400	-	-	-
4	Consumer's purchase price	10,000	-	8,400	-	6,000	-
5	Total marketing cost	2,325	-	1,625	-	50	-
6	Total profit margin	1,875	-	1,275	-	0	-
7	**Price spread**	**4,200**	**100.00**	**2,900**	**100.00**	**50**	**100.00**
8	**PSCR (%)**	**58.00**	**-**	**65.48**	**-**	**99.17**	**-**
9	**Market efficiency (Acharya's approach)**	**1.38**	**-**	**1.90**	**-**	**119**	**-**

preparation is presented in Table 3. The establishment cost needed for organic jaggery processing unit was Rs. 33,78,990. Variable cost per ton was Rs. 34,448 and price per ton of organic jaggery was Rs. 55,000. The break-even of output for organic jaggery processing unit was about 165 tons and the time period required to reach break-even quantity of output was 110 days.

Marketing efficiency of organic jaggery

In the study area, marketing channels through which organic jaggery was marketed from the producers to the ultimate consumers is described in Table 4. It was observed that, Channel I was most preferred for marketing of organic jaggery, as 52.34 per cent of total jaggery was marketed through this channel, followed by Channel II (30.97 %) and Channel III (16.69 %).

The marketing cost, profit margin, price spread, producer share in consumer rupee and marketing efficiency (Acharya's approach) are presented in Table 4. Three marketing channels considered in the study and organic jaggery was reaching the consumers at Rs. 10,000, Rs. 8,400 and Rs. 6,000 in through channel I, Channel II and Channel III, respectively. Total marketing cost was more in channel I (Rs.2,325) followed by Channel II (Rs. 1,625) and Channel III (Rs. 50). Total profit margin was also more in channel I (Rs. 1,275) followed by channel II (Rs.1,875). Producer share in consumer rupee was 99.17, 65.48 and 58 per cent, respectively in channel I, II and III. Marketing efficiency estimated by Acharya's approach was 1.38 (Channel I), 1.90 (Channel II), which implies channel I (119) was more efficient out of three channels considered in the study.

Conclusion

The nutritional superiority of organic jaggery compared to conventional jaggery makes it a highly attractive choice for consumers, thereby encouraging the promotion of organic jaggery production. Total capital investment in establishing a jaggery production unit was Rs. 33,78,990. Additionally, investing in organic jaggery production will create employment opportunities, particularly for the youth, contributing to both economic growth and the dissemination of healthier food options. The profitability of organic jaggery production has been demonstrated (B:C ratio 1.54), indicating a favourable opportunity for investment in organic jaggery processing units. Therefore, it is advisable to promote the establishment of additional organic jaggery processing units in major sugarcen growing districts of Karnataka. This expansion will also help to alleviate the workload on existing sugar factories while simultaneously providing a lucrative avenue for business growth. The government can organize necessary training/capacity building programmes involving jaggery processors to make expertise in production of diverse jaggery products. Creation and operation of organic farmer/producer groups can play a pivotal role in enhancing the marketing prospects for organic jaggery. This initiative can contribute to improving the socio-economic standing of the members by facilitating better market access and higher returns. Overall, with lots of issues to be addressed for better future, considering the factors like, soil health, human health, environment, etc., organic farming can play a pivotal role. From this study we have got a clear indication of profitability of organic sugarcane cultivation. Hence, concerned departments, organizations and institutes should come up with programmes which encourage more farmers to adopt organic sugarcane cultivation.

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