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RESEARCH PAPER

Economics of jaggery production in north Karnataka

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Abstract: India is the world's largest consumer and the second largest producer of sugarcane in the world next to Brazil. About 7.5% of Indian rural population covering about 60 million sugarcane farmers dependent on sugarcane based industries and many workers are involved in sugarcane processing.Karnataka ranks third in sugarcane cultivation that is concentrated in Belagavi, Bagalkote, Mandya, Bidar, Ballari and Vijayapura districts. The attempted in two districts, *viz*. Bagalkote and Belagavi districts of North Karnataka. Primary data required for the study was collected from 60 sugarcane farmers for the year 2018-19 30 from each district. The study revealed that the total capital investment in establishment of jaggery processing in Bagalkote district was estimated to be ₹ 3,72,502.67 and the total cost incurred in jaggery production per unit per annum was ₹ 47,66,021.89 and the returns realized was ₹ 54,61,130 with a net margin of ₹ 6,95,108. Similarly, in Belagavi district ₹ 4,26,116.97 of establishment cost with total cost incurred in jaggery production was ₹ 61,14,604.31 with a net profit of ₹ 6,65,301. The investment in production was financially feasible and economically viable in both the districts as evidenced in results of Pay Back Period which is less than three years, NPV ₹ 30,56,344 in Bagalkote and ₹ 31,37,414 in Belagavi districts. BC ratio were found to be more than one and internal rate of returns were higher than the opportunity cost of capital with 38.13 per cent and 37.61 per cent in Bagalkote and Belagavi districts respectively.

Key words: Financial, Feasibility, Jaggery, Production, Sugarcane

Introduction

Sugarcane is the most prominent worldwide crop due to its strategic position and immense uses in the daily life of almost all nations as well as industrial uses targeted at nutritional and economic sustains. Globally 80 per cent of the sugar comes from the sugarcane and 20 % from the sugar beet. (Yogesh, 2016).

India is world's largest producer of sugar and sugarcane. In India sugarcane is processed into sugar, gur and khandsari and undergoes considerable weight reduction during processing. It is also known as Gul, Gud, Jaggery, Vellum and Bella.Jaggery is known as the most nutritious agent among all sweeteners in the world as it contains all minerals and vitamins in sugarcane juice. Jaggery industry in India is an important cottage industry, which creates employment opportunities in rural areas. It plays an important role in uplifting the economy of the rural people. In ayurvedic way of medicine it is used as blood purifier and also it prevents disorders of bile. India as the major producer of jaggery, as it is recognised as one of the leading traders and exporters of jaggery to the world. India exported 3,13,826.00 MT of jaggery and confectionery products worth of Rs.1,606.08 crores during the year 2018-19.

In Karnataka, sugarcane is cultivated in an area of 4.71 lakh hectares, producing 424.08 lakh tonnes of cane next to Uttar Pradesh and Maharashtra. Major sugarcane growing in Karnataka are Belagavi, Bagalkote, Vijayapur districts and Mandya, Bidar, Ballari. Belagavi district ranks first in the cultivation of sugarcane in the state with an area of 2,06,864 hectares with a production of about 1,90,62,518 tones and yield of 92.15 tons/ hectare. Followed by Bagalkote district with an area of 1,01,924 hectares with a production of 78,43,052 and yield of 76.95 tons/ hectare respectively.

It is very much important to analyze the current status of the sugar and jaggery industries in Karnataka. Farmers are losing their interest in the production of jaggery, which eventually affects both the state and the nation's economic status of cane growers and the economy in which sugar cane is considered to be one of India's most valuable commercial crops. Keeping in view these aspects, the present study is a modest attempt to analyze the economics of jaggery production in the selected districts of North Karnataka. The study was undertaken with the specific objectives to estimate cost and returns in jaggery production and to analyse financial feasibility of investment in jaggery production unit.

Material and methods

The primary data required was collected from sugarcane growers of Bagalkote and Belagavi are the major sugarcane growing as well as jaggery production districts. Hence, these districts were purposively selected for present study. Multistage random sampling technique was employed for the selection of respondents. In all 60 jaggery processors were consulted and selected from study districts.

The data pertained to the agricultural year 2018-19. The primary data was collected with the help of a well-designed, pre-tested and comprehensive schedule exclusively prepared for the purpose. The schedule was prepared after discussing with various specialists.

For analysing the cost and returns of jaggery production tabular analysis was adopted. The financial feasibility of investment in jaggery processing was assessed by estimating techniques like Net Present Value, Benefit Cost Ratio, Internal Rate of Returns, and Pay Back Period

1. Net Present Value (NPV)

The Net present value represents the discounted value of the net cash inflows of the project. In the present study, a discount rate of 12 per cent was considered to estimate the net cash inflows representing the opportunity cost of capital. It was represented by

$$NPV = \sum_{i=1}^{n} Yn\,(1+r)^{-n} - I$$

Where,

Y_n = Net cash inflows in the year n

r = Discount rate

I = Initial investment

2. Benefit Cost Ratio (BCR)

The Benefit Cost Ratio (BCR) was worked out by using following formula

$$BCR = \frac{\Sigma \text{ Discounted cash inflow}}{\Sigma \text{ Discounted cash outflow}}$$

3. Internal Rate of Return (IRR)

The rate at which the Net Present Value of the project is equal to zero is Internal Rate of Return (IRR) of the project. The net cash inflows were discounted to determine the present worth following the interpolation technique. The method of interpolation followed was as under:

$$IRR = \left[\text{Lower discount rate}\right] + \left[\text{Difference between two discount rates}\right] \times \left[\frac{\text{Present worth of net cash flow at lower discount rate}}{\text{Absolute difference between the present worth of net cash flows at the two discount rates}}\right]$$

4. Pay Back Period (PBP)

Payback period represents the length of time required for the stream of cash proceeds produced by the investment to be equal to the original cash outlay *i.e.* the time required for the project to pay for itself. In the present study, payback period was calculated dividing the initial investment by average net cash inflow.

$$\text{Payback period} = \frac{\text{Initial investment}}{\text{Average annual net cash inflow}}$$

According to the payback criterion, the shorter the payback period, the more desirable is the project.

Result and discussion

The details of the various items of investment for establishment of jaggery production units are depicted in Table 1. The results revealed that total investment of ₹ 3, 72,502 and ₹ 4,26,116 was required to establish a jaggery processing unit in Bagalkote and Belagavi districts respectively. Among the various investment components, the land was the most prime cost both in Baglkote and Belagavi districts (₹ 1,77,500 and 1,99,333) attributed with a maximum share of 47.65 and 46.78 % of the total cost in Bagalkote and Belagavi districts respectively. In the study area there is only one furnace and single pan with different sizes was found with an electrically operated cane crushers and motors. These results were consistent with the study of Malkunje *et al.* (2017) and Patil (2016) in Kolhapur district of Maharashtra and Bhagyashree (2015) in her study on production, marketing and export performance of jaggery in Karnataka.

The detailed information on per processing unit annual inputs utilised and their cost in jaggery processing is estimated and presented in Table 2. The total variable cost incurred was found to be ₹ 46,99,515 in Bagalkote and ₹ 60,39,435 in Belagavi district. Among the total cost, the cost of raw material *i.e* sugarcane was the prime variable cost accounted for 77.66 and 78.21 per cent in Bagalkote and Belagavi production units respectively. Labour, fuel and diesel charges were the other important items accounted for 12.53 per cent and 12.88 per cent of the total cost in Bagalkote and Belagavi processing units respectively. Total cost was relatively high in Belagavi

Table 1. Establishment cost of jaggery processing unit

Particulars	Bagalkote district (n=30)			Belagavi district (n=30)		
	No.	Cost (₹)	Per cent	No.	Cost (₹)	Per cent
Land (acre)	0.568	177500	47.65	0.608	199333	46.78
Shed	1	14180	3.81	1	15837	3.72
Furnace	1	13985	3.75	1	14950	3.51
Pan (single)	1	40166	10.78	1	60016	14.08
Cane crusher	1	98803	26.52	1	105250	24.70
Motor	1	20776	5.58	1	21530	5.05
Filter plate	1	160	0.04	2	280	0.07
Bani	1	1000	0.27	1	1200	0.28
Gori	2	240	0.06	1	480	0.11
Hutta	2	300	0.08	4	600	0.14
Mali	2	280	0.08	2	300	0.07
Katti	1	1491	0.40	1	1750	0.41
Ash spade	2	220	0.06	2	240	0.06
Buckets	12	3000	0.81	15	3750	0.88
Drum	1	400	0.11	1	600	0.14
Total cost		372502	100.00		426116	100.00

Table 2. Jaggery Production cost per unit per annum

Particulars	Bagalkote district (n=30)				Belagavi district (n=30)			
	Quantity	Price/unit	Cost (₹)	Per cent	Quantity	Price/unit	Cost (₹)	Per cent
I. Variable cost								
Sugarcane (T)	1575	2350	3701250	77.66	1952	2450	4782400	78.21
Sodium bicarbonate (kg)	86.62	50	4331	0.09	0.00	0.00	0.00	0.00
Sodium hydrosulphate (kg)	94.50	150	14175	0.30	0.00	0.00	0.00	0.00
Phosphoric acid (kg)	39.37	85	3346	0.07	0.00	0.00	0.00	0.00
Lime super phosphate (kg)	157.50	50	7875	0.17	195.20	50.00	9760	0.16
Bhendi powder (kg)	23.63	550	12993	0.27	0.00	0.00	0.00	0.00
Edible oil (kg)	47.25	70	3307	0.07	68.32	65.00	4440	0.07
Soda powder (kg)	110.25	35	3858	0.08	146.40	35.00	5124	0.08
Fuel (tonne)	162.20	145	23575	0.49	165.50	135.25	44219	0.72
Men labour	1267.50	320	405600	8.51	1520.00	335.00	509200	8.33
Women labour	532.50	220	117150	2.46	720.00	240.00	172800	2.83
Diesel (lt)	728.00	70	50960	1.07	872.00	70.00	61040	1.00
Polythene bags (kg)	1.43	230	328	60.00	1.84	232.00	426	0.01
Miscellaneous	-	-	25450	0.05	-	-	2600	0.04
Interest on working	-	-	348218	7.31	-	-	447424	7.32
capital @ 8% Sub total			4699515	98.60	-	-	6039435	98.77
II. Fixed cost								
Depreciation	-	-	10423	0.22	-	-	11250	0.18
Rental value of land	-	-	11360	0.24	-	-	12760	0.21
Land revenue	-	-	22.50	0.00	-	-	23.50	0.00
Interest on fixed	-	-	44700	0.94	-	-	51134	0.84
capital @ 12% Sub total			66506	1.40			75168	1.23
Total cost (I+II)			4766021	100			6114604	100

(₹ 61,14,604) when compared to Bagalkot (₹ 47.66,021). The percentage of fixed cost to the total cost was found to be only 1.40 and 1.23 in Bagalkote and Belagavi processing units. The major component of fixed cost was interest on investment ₹ 44,700 and 51,134 which formed 0.94% and 0.84% of total cost respectively in Bagalkote and Belagavi processing units. Sodium bicarbonate, sodium hydrosulphate, phosphoric acid, lime super phosphate, bhendi powder, edible oil, soda powder (kg) were the essential chemicals used accounting for ₹ 48,887 in Bagalkote production units. Whereas in Belagavi production units, chemicals like lime super phosphate, edible oil (kg) and soda powder are used accounting for ₹ 9,760, 4440 and 5,124, respectively. The interest on variable cost was estimated to be ₹ 3,48218 and 4,47,424 which formed 7.31 and 7.32 per cent, respectively, in Bagalkote and Belagavi production units. It is interesting note that in Bagalkote district seven different chemicals were used in production of jaggery whereas in Belagavi, only three chemicals were used. The expenses were found to be around 98 per cent in both the districts of jaggery production.

The total expenditure incurred was found to be ₹ 47,66,021 and 61,15,658 with the gross returns (income) of ₹ 54,61,130 and 67,80,960 in Bagalkote and Belagavi districts respectively. The price per quintal of jaggery was found to be ₹ 36500 in Bagalkote district and ₹ 36000 in Belagavi district. The net returns realized was higher in Bagalkote units than that of Belagavi production units. This is mainly due to the producers used higher quantity of chemicals for preparation of the jaggery to attract the consumers. Whereas, in case of Belagavi district, producers used less quantity of chemicals for processing of jaggery that leads to dark brown colour of jaggery that attracts less number of consumers and fetch less price as compared to price of jaggery produced in Bagalkot district.

Table 3. Returns realized in jaggery production per unit per annum

Particulars	Bagalkote district (n=30)	Belagavi district(n=30)
Production (tonnes)	149.62	188.36
Price (₹ /tonne)	36500	36000
Gross returns (₹)	5461130	6780960
Total Cost of production (₹)	4766021	6115658
Net returns (₹)	695108	665301

The returns realized in jaggery production are presented in Table 3. The production of jaggery per processing unit in Bagalkote was 149.62 tonnes and in Belagavi district it was 188.36 tonnes per annum with the net returns realized was 6,95,108 and 6,65,301 interesting in the study districts.

The financial feasibility of investment in processing units was assessed and the results are presented in Table 4. The jaggery processing units required 1.65 and 2.06 years respectively in Bagalkote and Belagavi to repay the initial investment made in establishing the units. The net present value at 12% discount rate was worked out to ₹ 30,56,344 and

Table 4. Financial feasibility of investment in jaggery production unit

Particulars	Unit	Bagalkote (n=30) Value	Belagavi (n=30) Value
Net Present Value (NPW)	‘ In lakhs	3056344	3137414
Benefit- Cost Ratio (BCR)		1.10	1.08
Internal Rate of Return(IRR)	Per cent	38.13	37.61
Pay Back period (PBP)	Years	1.65	2.06

Note: Discount rate @ 12%

31,37,414 with the Benefit Cost ratio of 1.10 and 1.08, respectively in Bagalkote and Belagavi units. The Internal Rate of Return in jaggery processing unit was found to be 38.13 per cent in Bagalkote district and 37.61 per cent in Belagavi district. From the result, it could be concluded that positive net cash flows are induced within a year leading to higher IRR from the project. This revealed that the investment in jaggery processing units was found to be economically viable and financially feasible in the study area. Similar result was reported by Shubha (2011) in Mandya district in her study on jaggery processing. Imandi (2011) in Andra Pradesh.

Conclusion

Establishment of jaggery production unit is the profitable agribusiness.

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