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Economic analysis of banana fibre extraction units in Tamil Nadu: A comparative study of banana fibre and banana sheath product production

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Abstract

This study explores banana fibre extraction and banana sheath product units in Tamil Nadu, focusing on small and medium enterprises. It analyzes their cost economics, including costs, profits, and financial dimensions. The research study revealed that the banana sheath product unit is more financially efficient due to lower capital requirements. Both ventures yield positive net returns. However, banana sheath units generated higher profits. The benefit-cost ratio and return on investment (ROI) are favourable for both, with the banana sheath unit showing better results. The study emphasizes the importance of market stability and risk assessment for project viability and cost-efficiency optimization in banana fibre extraction units.

Keywords: Banana fibre, banana sheath products, cost economics, benefit-cost ratio, break-even analysis and return on investment

1. Introduction

This study explores the dynamics of banana fibre extraction units within this vibrant state. Tamil Nadu's expansive landscape, which blends urban and rural areas, offers an ideal setting to explore the intricacies of these units. Banana fibre extraction units form a vital segment of the agricultural and agro-processing sectors in Tamil Nadu. These units are engaged in producing valuable products from banana waste, contributing not only to economic growth but also aligning with sustainable practices by utilizing agricultural by-products. The state boasts a varied agro-climatic environment, enabling diverse agricultural practices, particularly banana cultivation, which serves as the primary raw material source for banana fibre extraction. With its amalgamation of traditional farming practices and emerging agro-processing industries, Tamil Nadu provides a dynamic backdrop for this investigation.

The costs and returns were equally important in determining relative profitability (Rathod, 2021) [9]. Cost economics refers to the study of the economic principles and factors related to the costs incurred in the production of goods or services. It involves analyzing how various costs, both fixed and variable, impact the decision-making process of individuals, businesses, and organizations. Cost economics plays a crucial role in determining pricing strategies, resource allocation, and assessing the financial performance of ventures. The benefit-cost ratio (BCR) of these firms were studied to assess the financial viability, prioritize resource allocation, evaluate risks, and make informed decisions about project selection and long-term planning, ensuring efficient use of resources and maximizing returns. Break-even analysis determines the firms' profitability threshold, sets sales targets, controls costs, makes informed decisions, assesses financial risk, and instils confidence in investors and lenders. The optimal returns on investment (ROI) is a fundamental concern for businesses across industries, driven by the goal of maximizing profitability and sustainability. Return on Investment (ROI) is one of the most popular performance measurement and evaluation metrics.

In this study, it is explored to examine the economic aspects of banana fibre processing units, including costs, profits, and other financial dimensions, with a specific focus on small and medium enterprises and entrepreneurs.

The data collected from a sample of 30 respondents, provided a comprehensive understanding of the performance of these units in the context of Tamil Nadu's dynamic agricultural landscape.

2. Materials and Methods

This study investigates banana fibre extraction units in Tamil Nadu. Collected primary data through structured interviews and questionnaires from a sample of 30 respondents using the snowball sampling technique, the sample respondents selected for this study were small and medium enterprises and entrepreneurs. The study examined various factors, including the economic aspects of banana fibre processing units, such as costs, profits, and other financial dimensions, provided a comprehensive understanding of their performance in this dynamic agricultural landscape.

2.1 Benefit-cost ratio

The Benefit-Cost Ratio (BCR) is a financial measure employed to evaluate the potential profitability or cost-efficiency of a project, investment, or decision. To calculate the BCR, divide the total expected benefits of a project by the total expected costs. If the BCR is greater than 1, it signified that the benefits are greater than costs, indicating a potentially favourable project or investment. Conversely, if the BCR is less than 1, it suggested that the costs surpass the benefits, indicating a less desirable outcome.

$$\text{Benefit-cost ratio} = \frac{\text{PV of expected benefits}}{\text{PV of expected costs}}$$

2.2 Break-even analysis

Break-even analysis is a financial technique employed to identify the moment when a business or project achieves a balance where the total income matches the total expenses, resulting in neither profit nor loss. To compute the break-even point, divide the fixed costs by the gap between the revenue generated per unit and the variable cost incurred per unit.

The formula for calculating the Break-Even Point (BEP) is:

$$\text{BEP} = \frac{\text{Fixed cost per unit}}{\text{Selling cost per unit} - \text{Variable cost per unit}}$$

The Break-Even Point (BEP) represents the number of units that need to be sold or produced to cover all fixed and variable costs, resulting in zero profit or loss.

2.3 Return on investment analysis

ROI functions as a rough gauge of an investment's profitability. To calculate it, begin by subtracting the initial investment cost from its eventual value. Then, divide the result by the initial expenditure and multiply it by 100.

$$\text{ROI} = \frac{\text{Revenue} - \text{Total Costs}}{\text{Total Costs}} * 100$$

3. Results and discussion

3.1 Cost economics of banana fibre and banana sheath products production

This analysis explores the costs, returns, and overall financial performance of small and medium enterprises and entrepreneurs engaged in harnessing value from banana waste, providing insights into the profitability and sustainability of these eco-friendly practices with reference to banana fibre firm and banana sheath products firm.

Table 1: Cost of production of banana fibre and banana sheath products by sample respondents (n=30)

S. No	Particulars	Banana fibre	Banana sheath
		Value (Rs/year)	Value (Rs/year)
A	Fixed cost		
	Rent on Building including tax	135466.67 (10.65)	135466.67 (13.30)
	Machineries (Rasapoder, Mat weaving machine, Tailoring machine and Rope-making machine)	283336 (22.27)	-
	Others	22866.67 (1.80)	12000 (1.18)
	Interest on fixed capital @ 12 percent	53000.32 (4.17)	17696.00 (1.74)
	Total Fixed Cost	494669.66 (38.89)	165162.67 (16.22)
B	Variable Cost		
	Raw material cost (One pseudostem = Rs.5, processing charge = Rs.5)	82782.67 (6.51)	82782.67 (8.13)
	Transportation cost (Loading charge = Rs.5, unloading charge = Rs.5)	82782.67 (6.51)	82782.67 (8.13)
	Labour charge (For fibre unit 5nos, Rs 250-300/day) (For sheath unit 4nos, Rs 500/day)	489133.33 (38.45)	567825.77 (55.77)
	Maintenance charge	7866.67 (0.62)	-
	Electricity charge	8053.33 (0.63)	4800 (0.47)
	Others	23466.67 (1.84)	23466.67 (2.30)
	Interest on working capital @ 12 percent	83290.24 (6.55)	91398.93 (8.98)
	Total Variable Cost	777375.57 (61.11)	853056.714 (83.78)
	Total (A+B)	1272045.23 (100.00)	1018219.38 (100.00)

The data provided in Table 1 reported that the cost of production of the business venture involved in banana fibre extraction and banana sheath product making.

The total costs were categorized into fixed and variable costs, offering insights into the financial structure of the enterprises. In terms of fixed costs, which remain relatively stable regardless of production volume, significant allocations are made towards building infrastructure (10.65%) and machinery (22.27%), including various essential equipment viz., Rasapoder, Mat weaving machines, Tailoring machines, and Rope-making machine. These investments are crucial for establishing and maintaining the production facilities. Additionally, a portion of the fixed capital is allocated for

miscellaneous expenses (1.80%) and covers the interest on fixed capital (4.17%). The total fixed costs amounted to Rs 4, 94,669.66, representing 38.89% of the overall total cost.

However, in case of variable costs, different costs like procurement of raw materials, transportation, labour charges, maintenance costs and electricity charges were included and fluctuated with the production level. Raw material costs about Rs 82,782.67 (6.51% of the total). Transportation costs are structured, with loading and unloading charges at Rs 5 each, totalling Rs 82,782.67 (6.51%). The most substantial variable expense is labour, accounting Rs 4,89,133.33 (38.45%) of the variable cost category. This labour cost includes wages ranging from Rs 250-300 per day. Maintenance charges

(0.62%) and electricity charges (0.63%) make up a smaller part of the variable cost structure, alongside with other miscellaneous expenses (1.84%). Lastly, the working costs also encompass interest at a rate of 12%, amounting to Rs 83,290.24 (6.55%). When considering the total costs (sum of fixed and variable costs), the data highlighted that the financial intricacies of operating a banana fibre extraction and processing unit, with the total costs amounting to Rs 12,72,045.23.

In case of banana sheath product, it was observed that, the total costs are categorized into fixed and variable costs, offering insights into the financial structure of the enterprise. In terms of fixed costs, which remain relatively stable regardless of production volume, significant allocations are made towards building infrastructure amounted Rs 1,35,466.67 (13.30) and machineries were not necessary since the products were handcrafted by artisan workers. These investments were crucial for establishing and maintaining the production facilities. The total fixed costs amounted to Rs 1,65,162.67, representing 16.22% of the overall total cost.

However, in case of Variable costs, different costs like procurement of raw materials, transportation, labour charges, maintenance costs and electricity charges were included and fluctuated with the production level. Raw material costs about Rs 82,782.67 (8.13% of the total). Transportation costs are structured, with loading and unloading charges at Rs 5 each, totalling Rs 82,782.67 (8.13%). The most substantial variable expense is labour, accounting Rs 5,67,825.77 (55.77%) of the

variable cost category. This labour cost includes wages ranging Rs 500 per day. Electricity charges (0.47%) make up a smaller part of the variable cost structure, alongside with other miscellaneous expenses (2.30%). Lastly, the working costs also encompassed interest at a rate of 12%, amounting to Rs 91,398.93 (8.98%). When considering the total costs (sum of fixed and variable costs), the data highlighted the financial intricacies of operating a banana fibre extraction and processing unit, with the total costs amounting to Rs 10,18,219.38.

Ray *et al.* (2013) ^[10] did a similar study for calculating the cost economics of banana fibre extraction firms. This comprehensive breakdown of costs is invaluable for business planning, budgeting, and decision-making, providing a clear understanding of where financial resources were allocated within the enterprise. This information could guide efforts to optimize cost-efficiency, enhance profitability, and ensure the sustainability of the banana fibre extraction and banana sheath product-making venture.

3.2 Cost and returns of banana fibre and banana sheath products production

The provided data in Table 2 revealed that a comprehensive insight into the financial performance, cost and returns of the banana fibre banana sheath and its value-added products. Ray *et al.* (2013) ^[10] conducted a similar study for estimating the benefit cost ratio, production and profit of banana fibre extraction firms.

Table 2: Cost and returns of banana fibre and banana sheath product production (n=30)

Particulars	Banana fibre	Banana sheath
	Value (Rs/year)	Value (Rs/year)
Total fixed cost (Rs) (A)	494669.66	165162.67
Total variable cost (Rs) (B)	777375.57	853056.71
Total production cost (Rs) (A+B)	1272045.23	1018219.38
Fibre Production (Kg for banana fibre) (No's for banana sheath products)	5000	16556
Average variable cost (Rs/kg)	155.48	51.53
Average selling price (Rs/kg)	400	200
Gross returns (Rs)	2000000	3311200
Net returns (Rs)	727954.77	2292980.62
Benefit-cost ratio	1.57	3.25
BEP(Kg/Year)	2022.98	1112.4
ROI	57.23	225.2

Sample respondents in the study area revealed that expenses towards total variable cost *viz.*, raw materials, labour, and utilities valued at Rs 7, 77,375.57 for banana fibre firm and Rs 8, 53,56.71 for banana sheath. On the other hand, the total production cost for banana fibre firm was Rs 12, 72,045.23 and Rs 10, 18,219.38 for banana sheath products, it encompassed not only the variable costs but also the fixed costs like rent and depreciation. This suggested that fixed cost played a substantial role in the overall cost structure.

The fibre production output of 5,000 kg indicated that the scale of production, which was crucial for understanding the capacity and scope of the business. With an average selling price of Rs 400 per kilogram, the gross returns amounted to Rs 20,00,000, which is the total revenue generated from selling the fibre. However, the net returns, after subtracting all production costs, stood at Rs 727,954.77.

However, the production capacity of banana sheath product was 16,556 units per year, with an average selling price of Rs 200 per unit, the gross returns amounted to Rs 33,11,200, which is the total revenue generated from the selling the banana sheath handicraft products. However, the net returns,

after subtracting all production costs, stood at Rs 22, 92,980.62

This represented the profit earned from the operation, which was significant metric indicated that the project's financial viability. With this, it could be observed that the banana sheath firm generated more returns when compared to banana fibre unit.

The benefit-cost ratio of banana fibre firm was (1.57:1), that for every rupee invested in this venture, there was a return of Rs 1.57. When compared with the banana sheath firm, the benefit cost ratio was (3.25:1), that is for every rupee invested there was a return of Rs 3.25. This suggested that the project generated positive returns and was financially sound. An important threshold to consider was benefit-cost ratio greater than 1, which implied that the project was profitable and beneficial to the investor.

The Break-Even Point (BEP) of 2,022.98 kg per year for banana fibre firm and 1112.4 units per year for banana sheath unit, denoted that the level of production at which the project covered all its costs, both variable and fixed. Beyond this point, every additional unit of production contributed to the

profit margin. This is a crucial metric for production planning and resource allocation.

Based on the data collected from the sample respondents the return on investment for banana fibre firm was 57.23%. However, in case of the banana sheath it was 225.2%. A higher ROI is generally favourable and indicated that the project is yielded substantial returns relative to the initial capital investment.

In summary, Table 2 suggested that both the fibre production and sheath handcraft production project were performing better with positive net returns, a healthy benefit-cost ratio, and a strong ROI. But when compared between banana sheath firm and banana fibre firm, the profitability was higher in case of banana sheath products.

4. Conclusion

This study investigated the cost economics of banana fibre extraction and banana sheath product production units in Tamil Nadu, focused on small and medium enterprises and entrepreneurs. The analysis revealed that the banana sheath product production unit was more financially efficient due to lower fixed capital requirements. Both ventures exhibited positive net returns, with the banana sheath unit generated higher profits. The possible reason could be that lower investment on machineries. The benefit-cost ratio for both projects indicated profitable venture, with the banana sheath firm showed a more favourable ratio of 3.25 compared to 1.57 for the banana fibre firm. Additionally, the return on investment (ROI) was notably higher in case of the banana sheath products at 225.2%. Compared to 57.23% for the banana fibre products. The study emphasized the importance of market opportunities and sustainability for the waste to wealth products produced from banana

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