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Economics of Women-led Sericulture Enterprise in Chikkaballapur District of Karnataka

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ABSTRACT

Sericulture plays important role in empowerment of women and this study emphasized on calculating the cost and return of cocoon production and reeling unit. The study was carried out in Chikballapur district of Karnataka state. Multistage sampling was done in Sidlaghatta and Chintamani taluks based on highest area under mulberry cultivation. Sixty women entrepreneur were selected from both the taluka undertaking both enterprises (15 each). Total cost involved in cocoon production was Rs. 0.548/- lakh per batch which comprises of Rs. 0.076/- lakh fixed cost and Rs. 0.472 lakh variable cost. Gross return accounted to Rs. 0.803 lakh/per batch and 6.826 lakh/year. Price of cocoon was Rs. 550/-kg. Returns per rupee invested was 1.40 for cocoon production. Capital requirement of multi end reeling unit was Rs 6.308 lakh comprised of reeling house, boiler and reeler .Cost involved in raw silk production was Rs. 0.405 lakh and annual expenditure was Rs. 106.059 lakh and returns from raw silk production was Rs. 119.054 lakh/year and Rs. 0.458 lakh/day. Returns per rupee investment was 1.13.

Key Words : Cocoon production, Gross income**,** Rearing units, Silk Reeling Units, Women Entrepreneur,

INTRODUCTION

Women entrepreneurs play a significant role in the industry, particularly in countries like India and China, where sericulture is a traditional and important economic activity. Their involvement not only empowers them economically but also plays a vital role in preserving cultural heritage and promoting sustainable development. Mulberry is widely distributed with different species (> 68 species), and major silk-producing countries have collected, evaluated, and conserved a good number of mulberry germ plasm accessions for their utilization in a targeted breeding program for evolving superior varieties (Saini, 2023).

After china India is the second largest producer of silk in world. It employs about 9.2 million people as on 2022-23. It produced 36,582 MT of silk. The major silk-producing states in the country are Andhra Pradesh, Assam, Bihar, Gujarat, Jammu and Kashmir, Karnataka, Chhattisgarh, Maharashtra, Tamil Nadu, Uttar Pradesh, and West Bengal. Karnataka contributed around 32.3% of the total silk. In FY23, India's exports of silk and silk products stood at US$ 220.58 million. Mysore and north Bangalore contribute to nearly 70 percent of mulberry silk production (Minhas, 2023). The study focused on calculating cost and returns of cocoon production and multi-end reeling unit undertaken by women entrepreneurs.

MATERIALS AND METHODS

Chikkaballapur is a major silk producing district in Karnataka so was purposively selected. Two taluks were selected namely Sidlaghatta and Chintamani based on high mulberry area. Multistage sampling technique was adopted for

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Table 1. Expenditure of cocoon production. (n=30)

Sr No.	Particular	Rs./batch (lakh)	Rs./Year (lakh)	Per cent
A.	Variable cost			
1.	Hired human labour			
	Male	0.025	0.213	4.54
	Female	0.024	0.204	4.36
2.	Family labour			
	Male	0.010	0.085	1.81
	Female	0.018	0.153	3.27
3.	Disease free layings (DFLs)	0.049	0.412	8.80
4.	Mulberry leaves	0.210	1.785	38.11
5.	Hired Mountages	0.013	0.106	2.27
6.	Disinfecting material	0.009	0.094	2.00
7.	Newspaper	0.003	0.022	0.47
8.	Jute gunny bags	0.006	0.051	1.09
9.	Electricity	0.003	0.028	0.61
10.	Miscellaneous	0.060	0.513	10.96
11.	Marketing cost	0.009	0.072	1.54
12.	Interest on working capital @ 8 %	0.035	0.299	6.39
	Total variable cost (A)	0.472	4.038	86.22
B.	Fixed cost			
1.	Depreciation on rearing house	0.050	0.425	9.07
2.	Depreciation on equipments	0.018	0.151	3.23
3.	Interest on fixed capital@12%	0.008	0.069	1.48
	Total fixed cost (B)	0.076	0.645	13.78
	Total cost(A+B)	0.548	4.684	100.00

the selection of sample women entrepreneurs. 15 respondents were selected from each taluka for cocoon production and reeling which makes a sample size of 60 (30 cocoon producing women entrepreneurs and 30 women reelers). The primary data were collected through a survey of individual sericulture women entrepreneurs with structured questionnaires through the personal interview method regarding the cost of production and output, return from the output, marketing of cocoons, marketing costs. The cost and returns earned by the women entrepreneurs were worked out by using the costs *i.e.* variable costs and fixed costs. The returns were worked out by using gross returns and net returns. In cocoon production an average women undertook 8 crops per year in the study area. Based on this per year cost and returns of cocoon production was worked out.

RESULTS AND DISCUSSION

Cost and returns of cocoon production

Costs and returns of cocoon production among 30 women entrepreneurs were calculated and are represented in Table 1 and Table 2. The total variable and fixed cost incurred per year was Rs. 4.038/- lakh and Rs. 0.645/- lakh. Cocoon production requires a significant quantity of mulberry leaves as the primary food source for silkworms. It was observed that per batch the highest cost was incurred on mulberry leaves with Rs. 0.210/- lakh followed by miscellaneous cost of Rs. 0.060/- lakh. The high cost was because mulberry leaves are a staple feed for silkworms and it must be of good quality. Thus, the highest

Table 2. Returns obtained from cocoon production. (n=30)

Sr. No.	Particular	(Rs. lakh/Batch	(Rs. lakh/Year	Per cent
1.	Main produce (cocoon)	0.770	6.545	96.15
2.	By produce (silk worm manure)	0.033	0.281	3.85
3.	Gross returns	0.803	6.826	100
4.	Net profit (GR-TC)	0.255	2.142	
5.	Returns per rupee investment (GR/TC)	1.46	1.46	
6.	Total quantity of cocoon output	140 kg	1,190 kg	
7.	Total quantity of silk waste output	1,100 kg	9,350 kg	
8.	Price of cocoons (Rs./ kg.)	Rs.550 per kg		
9.	Price of silk waste (Rs./q)	Rs. 300 per quintal		

proportionate share of expenditure was contributed by the mulberry leaves with 38.11 per cent followed by miscellaneous cost with 10.96 per cent, respectively. The expenditure on hired male and female labour was Rs. 0.025/- lakh and Rs. 0.024/- lakh per batch and per year was Rs. 0.213/- lakh and Rs. 0.204/- lakh respectively. Whereas, the family labour expenditure was Rs. 0.010/- lakh and Rs. 0.018/- lakh for male and female. However, the yearly expenditure was Rs. 0.085/- lakh and Rs. 0.153/- lakh respectively.

Female labour was encouraged more than male labour, possibly due to the specific skills women possess which is required for cocoon production. The proportionate expenditure on DFLs was Rs. 0.049 lakh per batch accounting for 8.80 per cent share of the total cost. This cost represents the price of acquiring high-quality silkworm eggs, which is critical to ensure healthy and productive silkworms.

The expenditure on disinfecting material, hired mountages, jute gunny bags were Rs. 0.009 lakh, Rs. 0.013 lakh , Rs. 0.006 lakh per batch and per year it was Rs. 0.094 lakh, Rs. 0.106 lakh and Rs. 0.051 lakh, respectively. Disinfecting materials like vijetha powder, lime powder and bleaching powder were used for maintaining a clean and disease-free environment for the silkworms. Ensuring a healthy environment is crucial for cocoon production. The cost incurred by newspaper, electricity and marketing cost was Rs. 0.022 lakh, Rs. 0.028 lakh and Rs. 0.072 lakh per year. The marketing cost associated with promoting and selling cocoon products. It's relatively low, indicating that marketing may not be a primary focus of this enterprise.

The cost incurred on depreciation cost of capital asset and depreciation on equipment was Rs. 0.050 lakh and Rs. 0.018 lakh per batch and per year was Rs. 0.425 lakh and Rs. 0.151 lakh, respectively. This expense reflects the annual depreciation of the rearing house and equipment used in cocoon production. The equipments were given to women with subsidies at 90 per cent for SC/ST and 70 per cent for OBC and minorities. The interest on working capital and fixed capital was Rs. 0.035 lakh and Rs. 0.008 lakh per batch and per year it was Rs. 0.299 lakh and Rs. 0.069 lakh, respectively. The proportionate expenditure on variable cost was 86.22 per cent. The share of expenditure on fixed cost was 13.78 per cent which indicates that long term investment was very small as compared to current investment.

The total income generated from main produce per batch and per year was found to be Rs. 0.770 lakh and Rs. 6.545 lakh, respectively. The per cent return of 96.15 indicates that a significant portion of the total returns comes from main produce, making it the primary income source in this venture. The income generated was Rs. 0.033 lakh/ batch and per year it was Rs. 0.281 lakh

Table 3. Capital requirement for establishing the multi-end reeling unit (Unit- 6 basin)

Sr. No	Item	Units	Cost/ Unit (Rs. lakh)	Total cost (Rs. lakh)	Life span (years)	Depreciation (Rs. lakh)/year)
1.	Reeling House (50*30 Sq. ft)	1	-	5.4	30	0.18
2.	Boiler	1	0.22	0.22	8	0.0275
3.	Reeler (Multiend) 6 basins	2	0.32	0.64	8	0.08
4.	Water storage tank	1	0.0475	0.0475	20	0.0024
	Total			6.308		0.2898

through the silkworm manure. Although, this contribution is relatively small compared to cocoon sales, it still adds to the overall returns and can be considered as an additional source of income. The net returns estimated per batch was Rs. 0.255 lakh and per year was Rs. 2.142 lakh with benefit- cost ratio of 1.46 per batch and 1.46 per year suggesting that the returns from cocoon and silkworm manure production exceed the costs, making it a financially viable business.

The results of the study were in line with the studies conducted by Roopa Hosali and Murthy (2015) and Manjunatha *et al* (2017).

The depreciation cost per year represents the capital requirements for establishing a multi end reeling unit is calculated based on the initial cost of the item and its expected lifespan. The reeling house is expected to last for 30 years and its value will gradually decrease over this period due to factors like maintenance costs and normal wear and tear. Therefore, it's reasonable to allocate Rs 0.18 lakh/ year as the depreciation cost. Boilers typically have a shorter lifespan due to the high-temperature operation and wear and tear associated with their function. Depreciating the boiler at Rs. 0.0275 lakh/year over 8 years accounts for the accelerated wear and tear and the need for potential replacements or repairs during this period.

Reelers are essential equipment in a reeling unit, and they are subject to regular use and potential maintenance. Depreciating them at Rs 0.08 lakh/ year over 8 years acknowledges the wear and tear they will endure and allows for potential upgrades or replacements as technology evolves. Water storage tanks generally have a longer lifespan compared to machinery or equipment. They are subject to corrosion and wear, but proper maintenance can extend their lifespan. Hence, the annual depreciation cost was Rs 0.0024 lakh per year which is relatively lower. Therefore, the depreciation cost of fixed assets was Rs. 0.2898 lakh per year.

Multi- end reeling machines developed to increase the quality of raw silk reeled and to overcome inadequacy in the quality of silk reeled in the traditional method of reeling. In the research area, majority of silk reelers were using multi-end reeling machines with 6 basins for reeling silk from cocoon. This versatile technology enables the efficient and high-quality reeling of silk from multiple cocoons simultaneously, significantly increasing productivity and income for women silk producers. Hence, they were selected for the study. The average cost for production of mulberry raw silk was presented in Table 4. The total cost of raw silk production was divided into variable costs and fixed costs per six reeling basins annually.

The total cost of mulberry raw silk production per six basins was Rs. 106.059 lakh annually (Table 4). Amongst, the major share of cost was accounted by variable cost of Rs. 105.334 lakh (99.32%) and fixed cost accounts to Rs. 0.363 lakh (0.34%). Cocoons were the most expensive in variable cost, accounting for Rs. 85.8 lakh (80.90%). They are important aspect in the reeling industry since the amount of raw material directly affects production costs. The other expenses were labour charges for men and women were of Rs. 2.34 lakh (2.21%) and Rs 3.12 lakh (2.94%) per annum, respectively. The labour charges for women and men were same but more women labours were involved in reeling than men labours. The

Table 4. Cost incurred on mulberry raw silk production.

Sr. No.	Particular	Requirement	Price (Rs. lakh)	Total (Rs. lakh)	Annual expenditure (Rs. lakh)	Per cent
A.	Variable cost					
1.	Cocoon (Kg/day)	100	0.0033	0.3300	85.800	80.90
2	Labour Charge/ day					
a.	Women	4	0.0030	0.0120	3.1200	2.94
b.	Men	3	0.0030	0.0090	2.3400	2.21
4.	Fire wood / (Kg)	180	0.0001	0.0108	2.8080	2.65
5.	Miscellaneous expenses			0.0065	1.6900	1.59
6.	Interest on working capital@10%			0.0368	9.5758	9.03
7.	Total variable cost (A)			**0.4051**	**105.3338**	99.32
B.	Fixed cost					
8.	License fee	-	-	-	0.006	0.01
9.	Depreciation cost / year	-	-	-	0.290	0.27
10.	Repair and maintenance / year	-	-	-	0.028	0.03
11.	Interest on fixed capital@12%	-	-	-	0.039	0.04
12.	Total fixed cost (B)	-	-	-	0.363	0.34
13.	Total cost (A+B)	-	-	0.405	106.059	100.00

miscellaneous expense which accounts for Rs. 1.690 lakh (1.59%) and comprises of expenses incurred on distilled water requirements for boilers, fuel costs, electrical charges, and transportation costs. The cost of fire wood accounted for about Rs. 2.808 lakh (2.65%), and interest on variable cost accounted for Rs. 9.576 lakh (9.03%) annually. Among the fixed costs, major contribution was from depreciation accounting to Rs. 0.290 lakh (0.27%) and repair and maintenance cost accounted to Rs0.028 lakh (0.03%). It was also evident that the total cost incurred for mulberry raw silk production per day was Rs. 0.405 lakh.

Multi- end reeling machines developed to increase the quality of raw silk reeled and to overcome inadequacy in the quality of silk reeled in the traditional method of reeling. In the research area, majority of silk reelers were using multi-end reeling machines with 6 basins for reeling silk from cocoon. This versatile technology enables the efficient and high-quality reeling of silk from multiple cocoons simultaneously, significantly increasing productivity and income for women silk producers. Hence, they were selected for the study. The average cost for production of mulberry raw silk was presented in Table 4. The total cost of raw silk production was divided into variable costs and fixed costs per six reeling basins annually.

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Table 5. Returns from mulberry raw silk production (per year). (n=30)

Sr. No.	Particular	Quantity		Returns (Rs. lakh)		
		Per day	Per year	Per day	Per year	%
	A. Main product					
1	Raw silk production (Kg)	11.8	4,307	0.431	111.982	94.06
	B. By-products					
2	Silk waste (Kg)	2.75	1,003.75	0.018	4.719	3.96
3	Dead pupae (Kg)	38.50	14,052.5	0.006	1.502	1.26
4	Defective cocoon (Kg)	1.82	664.3	0.003	0.852	0.72
	Gross returns (Rs. lakh)			0.458	119.054	100
	Net returns (GR-TC)			0.053	13.720	
	Returns per rupee investment (GR/TC)			1.13	1.13	
	Renditta (Kg)	7.8	7.8			

accounts for Rs. 1.690 lakh (1.59%) and comprises of expenses incurred on distilled water requirements for boilers, fuel costs, electrical charges, and transportation costs. The cost of fire wood accounted for about Rs. 2.808 lakh (2.65%), and interest on variable cost accounted for Rs. 9.576 lakh (9.03%) annually. Among the fixed costs, major contribution was from depreciation accounting to Rs. 0.290 lakh (0.27%) and repair and maintenance cost accounted to Rs0.028 lakh (0.03%). It was also evident that the total cost incurred for mulberry raw silk production per day was Rs. 0.405 lakh.

The data(Table 5) presented the annual returns from mulberry raw silk production, providing a breakdown of both the main product (raw silk) and its by-products. In a given year, the production of raw silk amounts to 4,307 kg, generating a substantial revenue of Rs. 111.982 lakh which constitutes approximately 94.06% of the gross returns. Additionally, there are three by-products: silk waste, dead pupae, and defective cocoons contributing 3.963%, 1.261%, and 0.715% to the gross returns, respectively. The total gross returns for the year and per day were Rs 119.054 lakh and Rs. 0.458 lakh respectively. After deducting the total cost provided in the table 12 from the gross returns, the net returns amount per year and per day is Rs 13.720 lakh and Rs. 0.053 lakh resulting in a benefit-cost ratio of 1.13 and 1.13 respectively. This data underscored the economic viability of mulberry raw silk production, with a focus on both the primary product and the associated by-products, indicating a positive economic outcome. The results of economics of reeling units were in line with the results of Rama Kumar *et al* (2008)

CONCLUSION

In Karnataka, Sericulture is main occupation which provides employment opportunity from egg production, chawki rearing, mulberry cultivation, cocoon production and reeling. The women's play an important role in sericulture because of their inherent characteristics and dedication. This study emphased on cost and returns of cocoon production and establishing the multi-end reeling unit. The results showed that major cost on cocoon was from mulberry of Rs. 1,78,500/year i.e, for 8 crops per year other cost involved in cocoon production were labour, Disease free layings (DFLs), hired mountages etc. The return from cocoon was Rs. 6.545 lakh/year so returns per rupee investment is 1.46. Capital requirement for

establishing the multi-end reeling unit was 6.308 lakh and cost for production of raw silk was Rs106.059 lakh and returns was 111.982 lakh with returns per rupee investment 1.13. This states that undertaking both the enterprise are profitable. The enterprises not only generates income but also empowers women, improves their livelihoods and promotes regional economic growth. Women's participation in this sector can motivate more women to join in sericulture and contribute to their communities' prosperity.

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