*Journal of Statistics & Management Systems*
ISSN 0972-0510 (Print), ISSN 2169-0014 (Online)
Vol. 29 (2026), No. 2, pp. 187–199
DOI : 10.47974/JSMS-1559

# Sericulture is a tool for the economic growth of marginal farmers with special reference to the Jalgoan District, Maharashtra

Kartik S. Mhavarkar *
Evelina Brajesh †
*Department of Management Studies (Off Campus)*
*Bharati Vidyapeeth (Deemed to be University)*
*Navi Mumbai 410210*
*Maharashtra*
*India*

**Abstract**

Silk is the most luxurious and artistically beautiful fabric available. When it comes to both the production and consumption of silk, India is ranked second in the world. Because it is the single largest importer of silk products, it is dependent on a significant quantity of raw silk to satisfy its domestic demand. There are only four types of natural silk that are grown in India: Mulberry, Eri, Tasar, and Mulberry. India is the only country that grows all four varieties of natural silk, making it a unique country in this regard. Bengaluru, Andhra Pradesh, Karnataka, Jammu Kashmir, and Tamil Nadu are the states that provide the highest quality raw materials for the production of silk. Mulberry silk is a product that India is famous for producing in copious quantities. These states are also known as traditional sericulture states. Maharashtra is a non-traditional state and ranked second among non-traditional states of silk-producing states in India. Chawki Rearing is considered to be a crucial step in the sericulture process. It has an enormous impact on the yield as well as the quality of silk produced. Enhanced cocoon yield, improved silkworm health, and increased efficiency are just a few of the advantages of this strategy. Investment in manpower, infrastructure, and disease management is also necessary to attain the economic sustainability of chawki raising, according to this study. For chawki farming to be successful, it is essential to have access to cutting-edge technology, to adopt effective strategies for disease prevention, and to make use of economies of scale to reduce expenses per unit and boost profitability. For small-scale farmers, in particular, government policies, subsidies, and technical assistance are essential to making chawki rearing profitable. Centralized chawki rearing centres (CRCs)

* *ORCID-ID:* **0009-0009-2512-5743**
† *ORCID-ID:* **0000-0003-4348-3762**

* *E-mail:* **kartik.mhavarkkar@gmail.com (Corresponding Author)**
† *E-mail:* **Evelina.brajesh@bharatividyapeeth.edu**

and cooperative models have demonstrated promise in distributing expenses and providing farmers with access to premium silkworms, thereby increasing the overall efficiency of silk production. Chawki raising is not without its difficulties, but it may be a lucrative endeavour with proper preparation, investment in technology, and the use of industry best practices. Sericulture producers can increase their income and the quality of their silk by adding chawki rearing as a specialist part of the industry. In the future, research and legislation should be directed toward the development of improved methods for the rearing of chawki and support networks to increase the profitability of this particularly significant stage in the silk value chain.

***Subject Classification (2020):*** *62P20 (Applications to economics), 91B84 (Economic time series analysis), 97M50 (Agricultural economics modelling).*

***Keywords:*** *Sericulture, Chawki rearing, Centralized chawki rearing center, Financial stability.*

## Introduction

"Sericulture is an agro-based industry that produces raw silk by raising silkworms". Crop, horticultural, dairy, and poultry production are traditional businesses in India that support agricultural production and help to strengthen the country's economy. Among them, "sericulture" can start on a small, medium, or large scale and generate adequate wealth at the lowest possible cost. Rearing silkworms involves raising an insect that produces raw silk to produce silk-related products. This business generates a considerable amount of profit at the lowest price[1],[7]. Alongside any other company, this one can expand. In terms of the production and consumption of raw silk, India ranks second on the international stage, immediately after China in the rankings. China has significantly increased its silk production. All four types of silk that are produced in the world, Muga, Eri, Tasar, and Mulberry, as well as all three types, Eri, Muga, and Tasar, are solely produced in India[1],[8]. As a result of its excellent mechanical strength, softness, delicate shine, and environmental friendliness, silk has been given the title of "Queen of fibers". "Because it increases the supply of textiles, silkworms are considered primarily the second most profitable insect after honeybees, which benefits all farmers. Four types of silk are produced in our nation today: Mulberry, Tasar, Eri, and Muga. This is because the demand for silk clothing is growing over time, whereas in the past, China sold silk moths worth the weight of gold [9]. Due to this demand, farmers are becoming increasingly interested in sericulture and transitioning to silk cultivation, which in turn increases their profits. These days, farmers and entrepreneurs can choose to start a sericulture business if they want to improve their income in addition to

producing traditional crops[2], [10]. In India, the agricultural and agro-based sectors are critical to the country's economy, not just in rural areas but also at the national level. In addition, villages are seeking other auxiliary rural industries, such as sericulture, due to the scarcity of land, low costs incurred, and the fact that agriculture is only practised during specific seasons, which can be one or two seasons of the year. Sericulture is a business that can operate throughout the year. It is a significant agro-based rural cottage industry that requires a lot of labor and creates employment opportunities compared to traditional cropping. In India's semi-urban and rural areas, it provides jobs for almost 7.9 million people. They participated in many different regions of sericulture, from pre- and post-cocoon operations, among others. Many activities, including the cultivation of mulberries, the generation of silkworm seeds, the rearing of farmer-cum, spinning, weaving, and the hand spinning of silk waste, are all included in the sericulture industry [11], [12]. This industry is responsible for providing a living for a significant segment of the population that lives across the borders between rural and semi-urban areas. Sericulture is primarily comprised of three interrelated activities: the cultivation of host plants, the raising of silkworms to produce cocoons, and the reeling of silk, in addition to a variety of post-cocoon procedures such as spinning, twisting, weaving, processing, printing, and so on, which involve the extraction of silk from cocoons[7]. Sericulture has a 30-day gestation period and is a reliable source of cash. Therefore, this benefits the socioeconomic development, women's empowerment, and educational status of the rural population [3], [6]. Sericulture encompasses practical elements such as boosting labor and land productivity, stabilizing cocoon production, improving silk yarn and fabric, and generating lucrative revenue for the impoverished in rural areas.

**Objectives:**

Understanding the financial viability of sericulture, particularly for small and marginal farmers, was the primary driving force behind the writing of this article. The following are the two main objectives decided by the researcher.

1. To comprehend the financial framework involved in sericulture farming.
2. To use the Benefit-Cost Ratio, NPV and Payback Period Method to examine the financial viability of investing in sericulture.

**Research methodology:**

The researcher has gathered information about the costs and annual production of the sericulture industry from thirty different farmers actively involved in sericulture activities in Jalgoan District to comprehend the financial framework of the industry and assess the financial feasibility of investing in sericulture. The data related to the costs involved in various stages of the sericulture business have been collected by the researcher using the telephonic interview method. To understand the financial viability of investing in sericulture, the researcher has selected three methods, viz. Benefit-Cost Ratio, NPV and Payback Period Method.

When it comes to capital planning, one of the most prominent tools utilized is the benefit-cost ratio (BCR), which is used to analyze whether it is financially feasible to initiate a new project. If the BCR is more than 1.0, then it is anticipated that the net present value (NPV) of an investment in a project will be positive. Alternatively, if the BCR of a project is negative, meaning it is less than 1.0, then the project is not a desirable choice for Investment because the costs will exceed the benefits.

Payback Period Method: Before investing in sericulture specifically for start-ups, it has been observed that farmers are interested in knowing how much time is required to recoup the initial investment amount in establishing a sericulture business. The time it takes for a project to generate a return on its initial Investment is referred to as the payback period. The term "time to break even" refers to the amount of time that must pass before an investment begins to generate a profit. When the payback period of an investment is reduced, its attractiveness increases. When an individual is aware of the amount of time it takes to get their money back, which is also referred to as the payback period, they will be more likely to succeed.

**Data Analysis:**

The following table lists the main factors that farmers should consider when determining whether investing in sericulture is financially feasible.

**Table 1**

**Prepared by the researcher: showing factors considered in determining the feasibility of Investment in Sericulture.**

| | |
|---|---|
| ***Area considered for mulberry cultivation*** | 1 Ha or 2-acre Area |
| ***Mulberry Variety*** | S36 |
| ***Plot System Type*** | Paired Row Plantation (90 + 150) cm x 60 cm Recommended |
| ***Expected Leaf Yield/Year*** | Average 30 tonnes/ha/year |
| ***No. of Batches per month*** | 1 |
| ***Total Number of Batches for rearing in a year*** | 12 |
| ***No. of DLF Per Year*** | 5000 DLFs / 400-500 DFLs per month |
| ***Mulberry Leaf requirement per Batch*** | 2500 kg. |
| ***Yard Manure required for Chawki Garden*** | 40MT/Ha/Year |

Farmers intending to invest in sericulture must assess various cost actors and yield production related to mulberry cultivation and chawki rearing. As shown in Table 1, sericulture under a 1-hectare or 2-acre area requires 5000 DFLs per year, producing approximately 12 rearing batches annually.

**Table 2**

**Table for the Cost of Establishment of Mulberry Garden, excluding land Cost.**

| **Particulars** | **Cost (Rs.)** |
|---|---|
| Use of Tractor Rotavator for 10 hrs. total in a year @ Rs 500/hour | 5000 |
| Harrowing for smoothing the soil for 6 hrs. @ Rs 500/hour | 3000 |
| 20 MT required Farmyard Manure @ Rs 1000/MT including 10 man-days required, @ wages Rs 500/day | 25000 |
| Workers required for Land Levelling at wages 6hrs @ Rs 500/hr. | 3000 |
| Mulberry Bed Creator workers were at wages of Rs. 500 for 6 hrs. | 3000 |
| 12000 saplings @ Rs. 10/- per ha. for (90 + 150) cm x 60 cm plot system | 120000 |
| Irrigation Sprinkler cost including material, Transportation, installation and GST | 100000 |
| ***Establishment Cost of Mulberry Garden (A) =*** | ***259,000*** |

**Table 3**

**Table for Cost of Upkeeping Mulberry Garden/Year Excluding Land Rent**

| Particulars | Cost (Rs.) |
|---|---|
| Mulberry Leaf harvest 6 harvests in a year of a 10-week duration each (60 man-days) @ Rs 500/man-day | 30000 |
| 40 MT/ha/year Manure required @ Rs 1000/MT | 40000 |
| Fertilizer | 5280 |
| Irrigation | 20000 |
| Pruning and leaf harvesting @ Rs. 500 for 50 man-days | 25000 |
| ***Maintenance Cost per Year (B)*** | ***120,280*** |
| ***Apportioned Cost (Approx.) (C)*** | ***6000*** |
| ***Total Maintenance Cost of Mulberry Garden/Year D (B+C) =*** | ***126,280*** |
| Total Mulberry Leaf Harvested per year (Kg.) | 30000 |
| Cost of 1 kg of leaf production | 4.21 |
| ***Total cost of 2500 kg. Mulberry Leaf Production (E) =*** | ***10,523*** |

Initial cost requirements for garden development are presented in Table 2, and yearly upkeep expenditure is given in Table 3. The data in Table 3 clearly indicate that annual mulberry maintenance costs total Rs. 126,280, including fertilizer, irrigation, and pruning requirements. The maintenance expenditure details are presented in Table 3.

**Table 4**

**Investment in Chawki Rearing Building and Equipment (for 5000 DFLs/Batch)**

| Particulars | Cost (Rs.) |
|---|---|
| RCC Construction of Rearing House for 1 ha. 50 ft x 20 ft (1000 Sq.ft.) | 325000 |
| Plastic Rearing Trays(3′x4′) Rs. 300 per unit for 500 units | 150000 |
| Chawki Stand for Rearing 20 Units @ Rs. 500 | 10000 |
| Feeding Stand 5 Units @ Rs. 300 | 1500 |

*Contd...*

| | |
|---|---|
| Generator | 50000 |
| Room Heater | 30000 |
| Humidifier | 20000 |
| Leaf Chopping Board & Chopping Knife | 3000 |
| Chandrika 300 Nos @ Rs. 70 | 21000 |
| ***Investment On Rearing House & Equipment (F) =*** | ***610,500*** |

**Table 5**

**Annual production costs and returns from the Investment.**

| **Particulars** | **Rs.** |
|---|---|
| Cost of 5000 DFLs | 900000 |
| Disinfectant cost for rearing | 30000 |
| Labor for silkworm rearing (5 women/day) for 100 days/yr @ Rs 300 per woman | 150000 |
| Packing and Transportation Cost for Transporting Cocoons | 15000 |
| ***Total Yearly Cost for Chawi Rearing (F) =*** | ***109,5000*** |
| Total cost of 2500 kg. leaf production | 10523 |
| Total cost for leaf production (for 12 batches) @ 2500 kg/batch (G) | 126280 |
| ***Total Yearly Expenses for Chawki Rearing Per Year (H=F+G) =*** | ***1221,280*** |
| ***In a year, the total DFLs under cocoon production =*** | ***5000*** |
| ***Per month, approximately DFLs used for cocoon production =*** | ***480 – 500*** |
| ***Total per Batch Earnings by selling 350 kg cocoons (500 DFLs) @ Rs. 700 per kg =*** | ***245,000*** |
| ***Total Annual Earnings (12 Batches) (Note-1 ) =*** | ***2940,000*** |

Infrastructure expenses such as RCC rearing House, trays, and climate-control units are summarized in Table 4, which amount to Rs. 6,10,000 as a one-time establishment requirement. Recurring financial outflows such as DFL purchase, labor, and disinfectant cost are provided in Table 6.

**Table 6**

**Income Statement: Prepared by the Researcher.**

| | | |
|---|---|---|
| Sales (Note I) | | ***2940,000*** |
| Less: Cost | | |
| Establishment Cost | 259000 | |
| Maintenance Cost | 126280 | |
| Cost of 2500 kg. leaf production | 10523 | |
| Total cost for chawi rearing for 12 batches, 5000dfl's | 1221280 | 1617083 |
| ***Net Earnings Yearly*** | | 13,22,917 |
| Per Batch Earnings (Monthly) | | 110,243 |

| | |
|---|---|
| Investment in Sericulture Farming (Rs.) – (Table No. 4) (iii) | 6,10,500 |
| Payback Period (Yrs.) = (i / iii) | 2.17 or 2 years 1 month |
| Benefit-Cost Ratio = Sales / Total Cost | 1.82 |

The complete profitability statement is presented in Table 6, which shows that annual net income is Rs. 13,22,917 and monthly earnings are Rs. 110,243. The Benefit-Cost Ratio of 1.82 and a Pay-back period of 2.17 years indicate a strong feasibility of sericulture as an income-enhancing activity for marginal farmers. The income-profitability structure is clearly summarized in Table 6.

**Data interpretation:**

Investigating the financial viability of investing in sericulture businesses is the primary goal of this research paper. Understanding and critically analyzing the financial structure of the sericulture business is necessary to achieve this goal. In order to determine whether investing in sericulture is truly financially feasible, the researcher has examined various crucial factors based on the interview and discussion method. Farmers should consider these factors before making such an investment. Those key factors mentioned in Table 1 are the area considered under mulberry cultivation is one hectare or 2 acres. The type of Mulberry plant variety is S36, considered to be the best variety for mulberry cultivation in Maharashtra based on climatic conditions. The number of chowki's i.e., Disease-Free Laying (DFLs), is 5000 for one ha. The model per year is used for the production of silk cocoons. The total number of silkworm rearing

batches is 12 in a year, or one batch per month. One DLF includes 480-500 silkworms or chawki available for rearing and cocoon production in a year. Around 100 DFLs produce 80 kg. Silk cocoons, so 500 DFLs produce 400 kg. Silk cocoons in a month or per batch. One kilogram of raw silk cocoons costs Rs. 700/-on the market.. Therefore, the total selling price of 400 kg. Silk cocoons are Rs. 280,000/- per batch or a month, and in a year total sale will be Rs. 29,40,000 from 12 batches of rearing.

The areas highlighted in Table No. 4 that require farmers to make one-time investments are those who are willing to be involved in sericulture and who are in charge of setting up the fundamental infrastructure for sericulture. It primarily includes building a rearing house. According to the Project Monitoring Committee (PMC), a state-level committee that oversees the execution of sericulture programs, a 1000 square foot rearing house, costing Rs. 325,000, is needed for a one-hectare plot used for mulberry cultivation and rearing of 5000 DFLs. The cost of 500 units of plastic rearing trays needed to raise silkworms is Rs. 150,000. Due to their long lifespan and ease of disinfection, plastic trays are recommended over bamboo trays. Another crucial piece of equipment used in silkworm rearing costs Rs. 10,000, is the chawki stand. The rearing house must have the perfect climate, with a temperature of about 25 degrees and a relative humidity of 65 per cent. To produce and maintain healthy silkworms, it is mandatory to maintain an optimum degree of temperature and humidity inside the rearing house because it has a direct association with the silkworm's health and, consequently, the quality of silk cocoons. In order to monitor the climate inside the rearing house, it is necessary to purchase a room heater specifically required during the winter season, where the temperature drops below 15 degrees and a humidifier during the rainy season, because over-humidity also slows down the growth of silkworm and may affect the quality of raw silk. The Chandrika net, which costs Rs. 21,000 for 300 pieces, is used to help silkworms produce cocoons. This results in a one-time investment of Rs. 610,500 for one hectare. Sericulture model.

The cost of establishing a mulberry garden mentioned in Table 2 seems high. It includes 12,000 mulberry saplings for one hectare, it costs Rs. 120,000/-. The irrigation system for the plant's water supply is necessary because of the drought situation in summers in Jalgaon, as well as maintaining the temperature of the rearing house, which costs Rs. 100,000. The cost of irrigation is particularly high in the Jalgoan region because of the drought in the summers. Hence, the total cost of maintaining a mulberry garden is Rs. 126,280, which includes expenses for irrigation,

apportionment, fertilizer used to produce high-quality mulberry leaves, and mulberry leaf harvesting. 2500 kg of mulberry leaves must be produced in a month or batches, as it is considered to be a primary food of silkworms, which costs Rs. 10523 in order to harvest 30 tons of mulberry leaves from a 1 ha model per month.

Table 5 shows the details of the market price of buying 5000 DFLs at Rs. 15 each generates the cost of purchase of Rs. 900,000 annually. Additionally, the annual labor cost of rearing silkworms is Rs. 150,000. Thus, the total chawki rearing cost for 5000 DFLs per year comes to a total cost of Rs. 10,95,000. After adding the expenses related to mulberry leaf production it gives total cost of chawki rearing is Rs. 12,21,280. 500 DFLs produce 350 kg of cocoons and are currently selling in the market for Rs. 700 per kg. Hence, in a year, this will generate Rs. 29,40,000 revenues from 12 batches of rearing. Following the deduction of all annual expenses, which is mentioned in Table No. 5, Income Statement, the farmer's net income can be Rs. 13,22,917 in a year and Rs. 110,243 in a month or each batch. This gives a benefit-cost ratio of 1.82 (Table 6), showing that total earnings from selling superior quality cocoons in the market are 1.54 times greater than total costs incurred during the rearing process. More than 1 benefit-cost ratio indicates NPV is positive, which is sufficient to advise farmers to invest in the sericulture business. Additionally, the payback period of 2.17 (Table 6) years indicates that the farmer can recoup his investment from the proceeds from selling high-quality cocoons in the market in approximately two years. Sericulture is a low-risk side business that farmers who have at least one or two acres of land can consider investing in if the project has a positive net present value (NPV) and a variety of benefit-cost ratios.

**Assumptions:**

For the calculation of returns from the selling of silk cocoons from 5000 DLFs, the researcher has assumed that all DLFs are produced with a superior quality of cocoons, i.e. A grade quality of Silk cocoons. But in reality, silkworms are sensitive to the climatic conditions and the availability of mulberry leaves for feeding. Hence, under such circumstances, the quality of silk cocoons may vary from superior quality to average quality. Double cocoons, i.e., cocoons spun by two worms, Dead cocoons or melted cocoons, Multi-layered cocoons, UZI-infected cocoons, and thin-layered cocoons are those that produce inferior quality silk and

have low market value. In such cases, sales may decrease. Generally, fewer than five per cent of defects are allowed.

**Conclusion:**

Chawki Rearing is considered to be a crucial step in the sericulture process. It has an enormous impact on the yield as well as the quality of silk produced. A professional attitude and practice may be beneficial to your company in a variety of ways, including increased cocoon yield, improved silkworm health, and increased efficiency, to name just a few of our many potential advantages [4],[5]. According to the findings of this study, in order for chawki raising to result in financial rewards, substantial investments must be made in personnel, infrastructure, and disease management from the beginning of the process. "For chawki farming to be successful, it is considered that modern technology, effective techniques of disease prevention, and economies of scale that can reduce expenses and boost profitability are all essential components.. For small and medium-scale farmers, state government policies, subsidies, and technical assistance are essential to making chawki rearing profitable [1],[2],[6]. Centralized Chawki Rearing Centers (CRCs) have demonstrated promise in distributing expenses and giving farmers access to premium silkworms, which helps in increasing the overall efficiency of silk production. Careful planning, technology investment, and adherence to best practices, chawki rearing an economically viable practice despite its difficulties. The incorporation of chawki rearing as a specialized component into the operation of the sericulture farmers can increase both the financial stability of the farmers and the quality of the silk that they produce. In the future, research and regulatory efforts should prioritize the development of improved chawki rearing processes and the growth of support networks to increase the profitability of this essential step in the silk value chain production process.

**Limitations:**

The primary limitation of this article is that the research is restricted only to the Jalgaon District. Second, the researcher has not considered the benefits that the state government provides to farmers to help them start and run a successful sericulture business. Third, this research is limited to the production of mulberry silk, whereas the Western Ghats of Maharashtra offer enormous potential for Mulberry as well as Eri sericulture based on

soil and climate conditions suitable for Mulberry as well as Castor plants, considered as basic food plants for the Mulberry silkworm and Eri silkworm, respectively.

**Scope:**

The sole subject of this research paper is to educate farmers about the financial viability of starting a sericulture business as an alternative to relying solely on the erratic and moody traditional cropping pattern. However, it has been noted that the soil and climatic conditions of the various regions of Maharashtra state are ideal for the healthy growth of Mulberry as well as the Eri silkworm. Hence, farmers have a lot of potential to earn from Mulberry as well as Eri Sericulture from a scarce resource. However, due to a lack of awareness, the number of farmers engaged in sericulture is very less as compared to farmers belonging to traditional states of sericulture.

**References**

[1] Central Silk Board, Functioning of Central Silk Board and Performance of Indian Silk Industry: Revealed Comparative Advantage Analysis of Trade of Indian Silk and Silk Products (2017). [Online]. Available: www.csb.in. [Accessed: Sep. 24, 2023].

[2] Y. Diab and S. H. Rateb, "Economic feasibility study for silk production under Egyptian conditions," *Assiut Journal of Agricultural Sciences,* vol. 40, no. 2, pp. 136–159 (2009).

[3] S. R. Halder, Cost-Benefit Analysis of BRAC's Sericulture Programme. Dhaka, Bangladesh: BRAC (1998).

[4] H. Jayaram and H. Bindroo, "Economics of chawki rearing centres," in Commercial Chawki Rearing: Exploring New Horizons, pp. 29–35 (2013).

[5] J. R. Dasari, H. Jayaram, D. S. Somaprakash, and V. Sivaprasad, "Economic analysis of commercial chawki silkworm production in Tumakuru district of Karnataka," *International Journal of Tropical Agriculture,* vol. 36, no. 2, pp. 275–282 (2018).

[6] C. S. Kallimani and S. H. Doddamani, "Economic performance and factors discriminating against entrepreneurship of commercial chawki rearing centres of Karnataka," *Agricultural Research Journal*, vol. 5 (2021).

[7] G. Ganga and J. S. Chetty, An Introduction to Sericulture, New Delhi: Oxford & IBH Publishing Company (1991).

[8] G. S. Geetha and R. Indira, "Silkworm rearing by rural women in Karnataka: A path to empowerment," *Indian Journal of Gender Studies*, vol. 18, no. 1, pp. 89–108 (2011).

[9] A. Ghosh, Indian Economy: Its Nature and Problems (1988–89), Calcutta: Unknown Publisher (1988).

[10] C. Goswami and M. Bhattacharya, "Contribution of sericulture to women's income in Assam: A case study in Goalpara district," *International Journal of Scientific and Research Publications*, vol. 3, no. 3, pp. 735–742, (Mar. 2013). ISSN: 2250-3153.

[11] S. Gregory, Rural Labor and Sericulture: Typology, Strategies and Prospects. New Delhi, India: *Journal of Industrial Relations Publications,* pp. 365 – 376 (1994).

[12] H. G. Hanumappa and S. Erappa, Economic Issues in Sericulture: A Case Study of Karnataka. New Delhi, India: Oxford & IBH Publishing Co. (1985).

*Received May, 2025*