12 Employment Potential of Sericulture for Underprivileged Section: Assessment of Value Chain Analysis in Bangladesh

Md. Kamruzzaman, Md. Abdullah Al Mamun, Jayanta Das, Kamruzzaman, and G. M. Monirul Alam

Abstract

Value chain development has a significant impact on employment generation and poverty reduction. The value chain analysis is essential for an industry's successful establishment. The chapter aims to perform a SWOT analysis of the value chain of the sericulture industry in Bangladesh. We conducted 48 in-depth interviews from two districts for this study. Results reveal that mulberry leaves, silkworm eggs, cocoons, raw silk, silk yarn, and fabric are the main products in the value chain in the study area. Supply of agricultural goods, producing cocoons, reeling, weaving, dying, and printing are the major input functions in the value chain. Selling cocoons, raw silk, and silk yarn at the distribution functions plays a vital role in the value chain. Mulberry farmers get about 30% of profits from one *Bigha* farm each year. Due to low prices, farmers are not interested in cocoon production. Unfavorable climatic conditions are another drawback behind the decreasing production of cocoons. Farmers get only about 25% of profits using traditional reeling, which is much lower than the modern method. As a result, the local weaving industry depends on imported silk yarn, contributing to declining local product demand.

Keywords

Sericulture · Value chain · Silkworm production · Problems · Bangladesh

Md. Kamruzzaman (✉) · Md. A. Al Mamun
Institute of Bangladesh Studies, University of Rajshahi, Rajshahi, Bangladesh
e-mail: mkzaman@ru.ac.bd

Md.A. Al Mamun
e-mail: shuzon.mamun@gmail.com

J. Das
Department of Geography, Rampurhat College, Rampurhat, Birbhum 731224, India
e-mail: jayanta.das@gmail.com

Kamruzzaman
Social Science Research Council, Ministry of Planning, Government Republic of Bangladesh, Dhaka, Bangladesh
e-mail: ssrc.planningdivision@yahoo.com

G. M.M. Alam
Department of Agribusiness, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur, Bangladesh
e-mail: gmalam@bsmrau.edu.bd

12.1 Introduction

The development of a country depends on its participation in the process of industrialization, which largely depends on global supply chains (Gereffi and Lee 2012). Chain refers to a vertical relationship between producers and buyers. It also indicates a movement of products to the consumers (Meaton et al. 2013). The efficient and timely distribution of products across the

J. Das and S. Halder (eds.), *Advancement of GI-Science and Sustainable Agriculture*, GIScience and Geo-environmental Modelling, https://doi.org/10.1007/978-3-031-36825-7_12

supply chain is the key issue in international trade (Gereffi and Lee 2012). The value chain transforms a conception into a product or service and delivers it to final consumers through different stages (Kaplinsky and Morris 2001). The process leads to the final utilization of a product or service (Sturgeon 2001; Ponte et al. 2019).

One can understand the potential impact of value chain development on poverty reduction using value chain analysis which includes governance, coordination, policies, and operations to create links and reliance between actors in the chain. It also specifies the existence and evolution of the relationship between the actors (Rosales et al. 2017). The global value chain focuses on creating values for goods and services throughout economic activities (Gereffi 2011, 2013). It upgrades the distribution channel by establishing the structural connectivity between the input and output processes among farms and countries (Lee and Gereffi 2015; Akram 2015). It also helps to understand the creation, capture, and sustenance of values in different industries (Gereffi and Lee 2016).

Sericulture is the mixture of growing plants and rearing insects that produce silk (Ruiz et al. 2020). Tesfa et al. (2014) and Sime and Siraj (2020) have studied the status, opportunities, and constraints of the production systems and marketing channels of sericulture in Ethiopia. Similarly, Jantakat and Tangjaturasopon (2012) have pointed out the barriers (e.g., weak sales and marketing systems with insufficient data) in the value chain process for silk production in the Nakhonchaiburin zone, Thailand. The chapter has also emphasized silk production and marketing. Angadi et al. (2013) have drawn attention to expanding the new applications of the waste of mulberry plants, which may bring additional income and establish the sericulture industry as more cost-effective. Shukla (2012) has addressed the cost of farming mulberry plants and the profits from the cultivation and silkworm rearing in the Udaipur district in Rajasthan, India. He has focused on human labor in the expensive sericulture industry. Eswarappa (2011) has discussed the role of Community-Based Organizations (CBOs) in developing the sericulture sector in Andhra Pradesh, India. Sujatha et al. (2015) have investigated the impact of socioeconomic factors on the adoption of new technologies in the sericulture industry in Andhra Pradesh, India, such as education, experience, cocoon yield, and cocoon price. They have found a constructive impact on decisions of farmer regarding the issue. Porrasa et al. (2017) have studied the Hilsa value chain that provides data and indications on developments and profit-making of Hilsa fish in Bangladesh. Hossain et al. (2019) have investigated the market dynamics of sunflowers in coastal Bangladesh. They have identified the shortage of quality seeds of sunflowers and their price fluctuation. The whole value chain of sunflowers, which includes collectors, processors, wholesalers, and retailers, gets more profit than farmers. Uddin et al. (2018) have assessed the value chain of fishes like Pangas and Tilapia and analyzed the governance of the market players in Bangladesh. They have indicated the negative scenarios of fishes like Pangas and Tilapia production due to poor market infrastructure and increasing fodder costs.

However, none of the studies looked at the strength, weaknesses, opportunities, and threats for further development of the value chain of the sericulture industry in Bangladesh. The ultimate aim of this chapter is to figure out the complete value chain of sericulture in Bangladesh and to intend to generate employment opportunities. Furthermore, the study aimed at analyzing the value chain to (i) understand the main features of value chains of sericulture; (ii) identify and measure the weaknesses and threats along the value chain; (iii) identify existing profitability in the sericulture industry; and (iv) suggest the strengths and opportunities of this sector.

12.2 Methods

12.2.1 Study Area Selection

Sericulture is widely produced in Bagha, Charghat, Paba, and Godagari Upazilas of Rajshahi district, Bholahat, Shibganj, Nachol, and Gomostapur of Chapainawabganj district, and some selected areas of Thakurgaon and Panchagorh districts in Bangladesh. To achieve the predetermined objectives, we have purposively

selected sericulture production areas: Bagha and Charghat Upazilas from Rajshahi district and Bholahat Upazila from Chapainawabganj district because sericulture production is much higher in these areas than that of other areas of Bangladesh. We have considered Bholahat Upazila of Chapainawabganj district as the most important production and trading area of sericulture for our analytical research on the value chain of sericulture (Figs. 12.1 and 12.2).

Fig. 12.1 Sericulture cultivated areas in Bangladesh

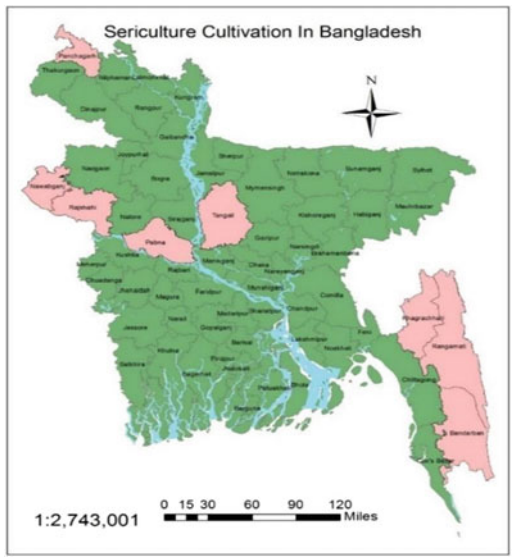


Fig. 12.2 Map showing the study areas

12.2.2 Sample Size Selection

The sample size for the in-depth interview was 48. Among the selected samples, 36 were from experienced farmers, two from modern reelers (who have dealt with reeling industry), three from traditional reelers from Bholahat Upazila, two from the weaving industry, two from traditional weavers, and three officers from Bangladesh Sericulture Research and Training Institute (BSRTI) (one from each wing namely cocoon/silkworm, reeling and farming research wings, respectively). Key informants were selected from farmers, agriculture extension officials, researchers, owners of the reeling and weaving industry (both traditional and modern), and traders. The total number of key informants was 18; among them, six were from farmers, four from agriculture extension officials (local and head office), two researchers from BSRTI, two from reeling industries (traditional and modern), two from weaving industries (traditional and modern), and two from traders.

12.2.3 Data Sources and Collection Tools

We collected secondary data from different sources such as the Bangladesh Sericulture Development Board (BSDB) and Bangladesh Sericulture Research and Training Institute, different research articles published in different journals, annual reports of BSDB, and privately owned silk industries and websites. A literature survey was conducted using document and content analysis for secondary data collection. We collected primary data from the respondents of the study area through in-depth interviews, FGD, and Key-Informant Interviews (KII). The face-to-face interviews were conducted with structured and semi-structured questionnaires to collect the required data. For cost margin analysis, relevant information regarding fixed cost, variable cost, revenue, etc., was collected through a structured questionnaire. We also collected comprehensive data from key informants using face-to-face interviews. In addition, we conducted three

focus group discussions, two in two Upazilas consisting of farmers and sericulture extension officials and one at Rajshahi City consisting of officials from BSRTI and BSDB, modern and traditional reelers and weavers.

12.2.4 Data Analyzing Tools

We used descriptive statistics to analyze the collected quantitative data using Statistical Package for Social Sciences (IBM SPSS) version 22.0 software. The qualitative data were interpreted using an inductive reasoning process based on research objectives and findings of the quantitative data. Nguyen and Eiligman (2010) used an analytical framework that illustrates the functions and links between each process of value chain.

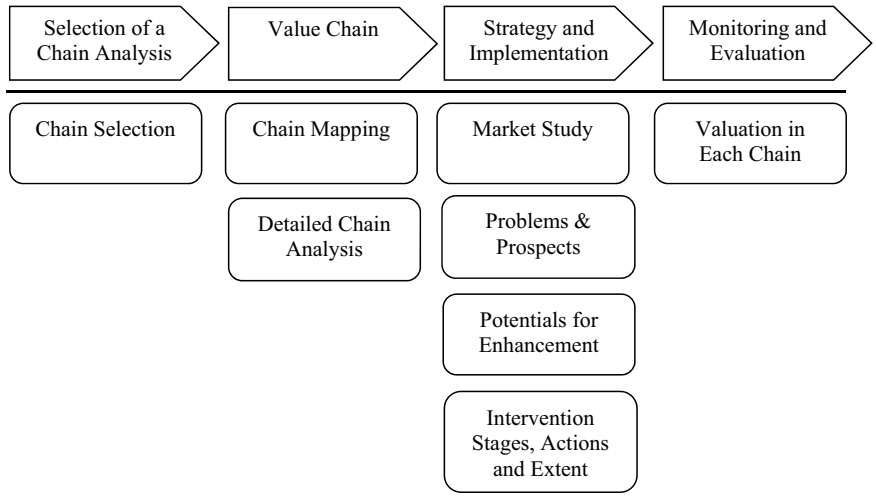
(A) Analytical framework of the value chain

We used the above analytical framework to develop functional chain mapping, identifying categories of actors in value chains and their relations, constraints of each stage of value chains as a whole, and providing some preliminary suggestions for further promotion of sericulture in Bangladesh. Furthermore, we used a contingent valuation method for valuation measurement to explore the economic prospects of sericulture.

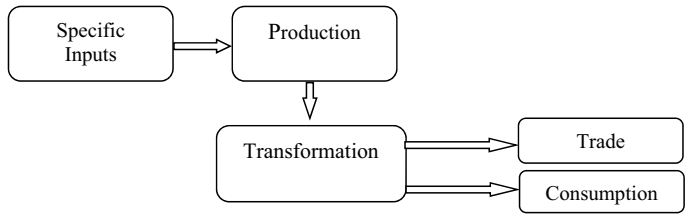
12.3 Results and Discussion

12.3.1 Main Products in the Sericulture Value Chain

A value chain identifies customers' demands and adds value to the products or services of



(B) Analytical framework for valuation of sericulture chain



industries (Jantakat and Tangjaturasopon 2012). A long value chain and structure are the sericulture industry's characteristics that include several products with economic value (Buhroo et al. 2018). It starts from silk reeling and spinning in the agriculture sector and ends up in the textile and apparel companies. The supply chain creates value for various products (e.g., cocoons, silk yarn, silk textiles, and apparel) of the sericulture industry (Hui 2010).

Mulberry Leaves

Mulberry leaves are the only source to rear silkworms (Rohela et al. 2020). A mulberry orchard usually has a 15–20 years life cycle of optimal production. Mulberry leaves can be harvested six months after plantation. It depends on the variety of mulberry species and weather. At maturity, one *bigha* land produces around 2000–2500 kg of leaves at the field level (BSRTI 2014).

Silkworm Egg

The fluid state of proteins in a worm is known as silkworm (Saikia 2011). The first stage of silk production is the laying of silkworm eggs in a controlled environment with appropriate instruments, such as an aluminum box. After that, it is ensured that they are free from diseases. The female silkworm lays 300–400 eggs simultaneously, called a cluster of eggs. Then the tiny eggs are incubated for up to seven days until they hatch into larvae. In the case of a natural environment, hatching time depends on season and weather, as practiced in Bangladesh. Generally, farmers buy silkworm eggs from BSDB nurseries at a minimum price. However, they cannot use modern technologies. Farmers need more space for rearing in a disease-free environment, rather than using their living room or nearby living room. Farmers usually use bamboo-made coarse mats (*Chatai*). Conceptually, it is called the first instar. In Bangladesh, white and yellow species having different resistance abilities are usually used for rearing silkworms. The yellow species can resist hot weather conditions (like the weather condition in Rajshahi), while the white species can cope with the cold weather in the northern part of Bangladesh (like the weather condition in Panchagarh). Larva, which has a special type of protein, consumes mulberry leaves that produce silk. However, the finest silk yarn depends on the quality of leaves and management at different stages.

Cocoon

Once hatched, farmers in Bangladesh put larvae in a locally bamboo-made *Chatai* and feed them huge amounts of chopped young mulberry leaves. This stage is called the second instar. In this way, silkworms complete five instars to produce a cocoon. Usually, in the last instar, silkworms consume about 80% of the full feeds of their life cycle. After the fifth instar, the mature larvae are transferred into bamboo-made round shape casing (locally called *Chandrika*) for spinning to produce silk, and these larvae transform into cocoons within 24–48 h. The silkworm rotates its body to construct a cocoon and produces about a kilometer of silk filament, and the length depends on the species. The quality and length of filament depend on the quality of round shape casing and the timing of shifting from *Chatai* to *Chandrika*. In Bangladesh, farmers use bamboo-made casing, which is unsuitable for spinning. Good quality cocoon is the main benchmark for producing high quality silk (Halder 1999). The cocoon must be boiled or dried within 2-3 days to prepare for reeling. Otherwise, the larva inside the cocoon will turn into a live moth and the moth comes out by cutting the cocoon shell. These cocoons will not be used for reeling.

Raw Silk

The cocoon is treated with hot air or steam and boiling water before producing the raw silk. The silk is then unbound from the cocoon by softening the sericin. Then, the silk delicately and carefully unwind from 4 to 8 cocoons together at a time, sometimes with a slight twist to create a single strand. One kg of raw silk yarn generally requires 12–15 kg of cocoons, which depends on seasonal production (cycles) in the study areas.

However, one kg of raw silk normally requires only 7.6 kg of cocoons in other countries like China, Vietnam, etc.

Dead Larva

Once the cocoon is boiled in hot water and raw silk is reeled, the dead larva inside the cocoon can be served as fish and dairy feed and even considered as organic fertilizer in Bangladesh. However, farmers are usually reluctant to sell the dead larva due to market scarcity. We found little demand of dead larva in local market. Each kilogram of dead larva's sell price is only BDT 4–5 which is not profitable due to its high processing cost. Sometimes farmers use it as poultry feed; otherwise, they throw away this dead larva.

Silk Yarn

Raw silk still contains sericin and fibroin. After washing in soap and boiling water, the silk yarn is left soft, lustrous, and up to 30% lighter. The silk yarn is twisted into a strong strand for weaving or knitting. Creating the silk yarn is called 'throwing,' which prevents the thread from splitting into its constituent fibers.

Silk Fabric

Weavers use silk yarn to produce final products after dying and designing it. In some cases, designing parts is very important after weaving. In Bangladesh, silk products are mostly three pieces, scarves, handbags, s*haree*, etc., for women and *panjabi*, shirts, ties, etc., for men and silk clothes, tablecloths, silk photo frames, etc., for general use, which usually sell in domestic as well as international markets. In the study area of Bholahat, some reelers make silk fabrics and silk brocade using *motka* silk (yarn made from silk waste) and sell it in different places in Bangladesh.

12.3.2 The Analytical Framework of the Value Chain

There are different actors and stages involved in the sericulture industry. Value chain analysis with detailed descriptions of these actors and stages is shown in Fig. 12.3.

12.3.3 Description of Value Chain Actors

Table 12.1 shows the description of value chain actors at different stages in the study area.

12.3.4 State of Supporting Institutions

The sericulture industry in Bangladesh suffers from a lack of institutional assistance (Krishnan and Gurung 2015). It needs more support from meso-level bodies such as local authorities, business associations, agro-forestry institutes, or trade promotion agencies. Due to the absence of specific policy from those institutions, developing of sericulture subsector is generally mentioned as an objective in the local socioeconomic development plans of BSDB. However, more improvement needs to be made due to a requirement for more funding sources and technologies. In some places within the study areas, such as Mirganj, Bagha, and Bholahat, farmers get very modest financial and technical support from local BSDB offices. Besides, some constraints remain at the macro- and micro-levels. The main limitations identified at the macro- and micro-levels are illustrated in Fig. 12.4.

12.3.5 Analysis of the Value Chain

The calculation and presentation of value addition for sericulture are based on the following facts (Table 12.2).

The life cycle of the mulberry orchard is 20–25 years for optimal leaf production. After three years, about 30% of profit gets from one *Bigha* per year in the mulberry garden (Table 12.3). Initially, leaf production is minimal; after three years, it will increase.

However, at present, farmers are uninterested in mulberry gardening due to the limited market of mulberry leaves. The production of the present mulberry leaves variety is lower than the production, predicted by BSRTI. Consequently, farmers have decreased silkworm rearing. So,

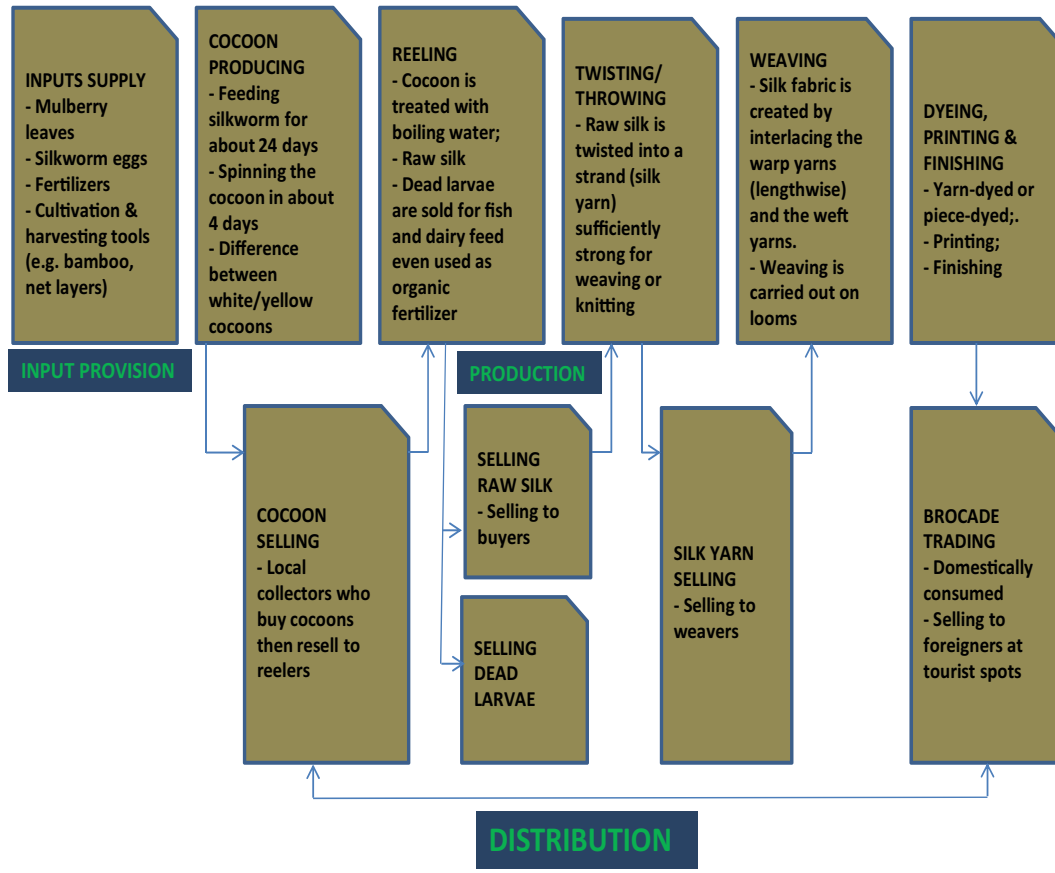


Fig. 12.3 Sericulture value chain functions

mulberry production might be profitable if the silkworm rearing and price of cocoon increase.

Table 12.4 shows that silkworm rearing is a profitable business in Bangladesh, as found in the study areas. From 100 Disease-free Layer: in sericulture, one egg, which means a cluster of eggs laid by a silkworm (DFL) rearing in a cycle, we found 55 kg cocoons, but it varies from farmer to farmer, area to area, and also from cycle to cycle (*Bondh*). We found more than nearly 30% of profits from one cycle in 100 DFL eggs. From our observation and FGD during the field survey, farmers face different problems in selling cocoons, such as monopoly pricing, lack of modern technology, and insufficient and disease-free quality leaves. Mulberry orchards are converted into mango orchards, and existing mulberry orchards are affected and polluted by different pesticides used in different crop production, especially in mango cultivation in the study area. Therefore, it takes work to motivate farmers toward silkworm cultivation. Current cocoon production needs to be increased in the study areas. In addition, the price of cocoons could be more cost-effective, discouraging the farmers from rear the silkworm. The yield of mulberry leaves and silkworm production are hampered by various risk factors, such as hot and humid weather, lack of quality eggs and mulberry leaves.

A. **Reeling**

See Tables 12.5 and 12.6.

Two types of reeling are found in the study areas. In Bholahat, some farmers are still follow the traditionally reeling, but in the other two

Table 12.1 Description of value chain actors in the study area at present

Location		Inputs supply	Output	Reeling/ twisting	Weaving/finishing	Distributions
Rajshahi	Bagha	Silkworm	Cocoon production	No reelers	No weavers	Local buyers from farmers
		– Eggs				
		– *Chatai*				
		– *Chandrica*				
		– Labor				
		– Medicine				
		– Feeding (leaves)				
		Mulberry	Leave production			
		– Sapling				
		– Fertilizer				
		– Pesticides				
		– Land				
		– Labor				
		– Fencing				
	Charghat	Silkworm	Mulberry plantation and rearing silkworms for Cocoon production	No reelers	No weavers	Local buyers from farmers
		– Eggs				
		– Chatai				
		– Chandrica				
		– Labor				
		– Medicine				
		– Feeding (leaves)				
		Mulberry				
		– Sapling				
		– Fertilizer				
		– Pesticides				
		– Land				
		– Labor				
		– Fencing				
Chapainawabganj	Bholahat	Silkworm	Cocoon production	Most of the cocoon farmers are involved in reeling	Insufficient supply of silk yarn for weaving and brocade products	Local buyers for selling to others, produce silk yarn and Andy silk cloths
		– Eggs				
		– *Chatai*				
		– *Chandrica*				
		– Labor				
		– Medicine				
		– Feeding (leaves)				
		Mulberry				
		– Sapling				

(continued)

Table 12.1 (continued)

Location		Inputs supply	Output	Reeling/ twisting	Weaving/finishing	Distributions
		– Fertilizer				
		– Pesticides				
		– Land				
		– Labor				
		– Fencing				

Source Field survey

places, there are no traditional as well as modern reelers. Farmers usually use *Kathghai*, traditional wooden equipment, for reeling. Farmers are getting about 25% of profits through this method, but in modern reeling, it is higher (40.90%), as shown in the above table. The high quality of silk yarn produced through modern reeling, results in a higher price than traditionally produced silk. In the sericulture value chain, reeling is a more profitable stage than mulberry cultivation and silkworm rearing. Though mulberry cultivation is less profitable, it is inevitable in the sericulture value chain. However, it is unfortunate that farmers are abundant with cocoons rearing due to insufficient feed for silkworm rearing, causing an extreme decrease of the cocoons which are the raw materials of silk yarn.

B. **Weaving**

See Tables 12.7 and 12.8.

Weaving and designing are closely related to sericulture finish products. Nowadays, weaving is found only in the BISIC area of Rajshahi City. However, we found a few traditional weavers in Bholahat of Chapainawabganj district, which was once the epicenter of sericulture. Recently, these weavers are producing only silk *Thaan* (an entire sheet of woven fabric) without dying and designing, and this *Thaan* sells into the modern weaving industries at Rajshahi and Dhaka for further dying and designing into a finished product. Modern weaving industries in Rajshahi mainly use imported silk yarn due to an insufficient supply of local yarn; imported silk yarn is more cost-effective than local yarn due to government tax policy. In the case of dying and designing, it is more profitable than other stages of the sericulture value chain. Firstly, there are no risk factors in dying and designing. There are a few dying and designing industries in Rajshahi (only two are running in full swing). It creates a monopoly market for the traditional and modern silk *Thaan*. On the one hand, limited yarn and weaving industries create a monopoly market. In addition, the government yarn and weaving industry has been closed since 2002. Consequently, it pushes farmers to abandon silkworm rearing.

12.3.6 SWOT Analysis

A. Strength

- BSDB and BSRTI head offices are located in Rajshahi;
- There is sufficient infrastructure such as office space, research and training institute, and sericulture nursery in different Upazila levels in Bangladesh under BSDB;
- Available skilled human resources of BSDB and BSRTI;
- Household traditions of sericulture in this region;
- Favorable environment;

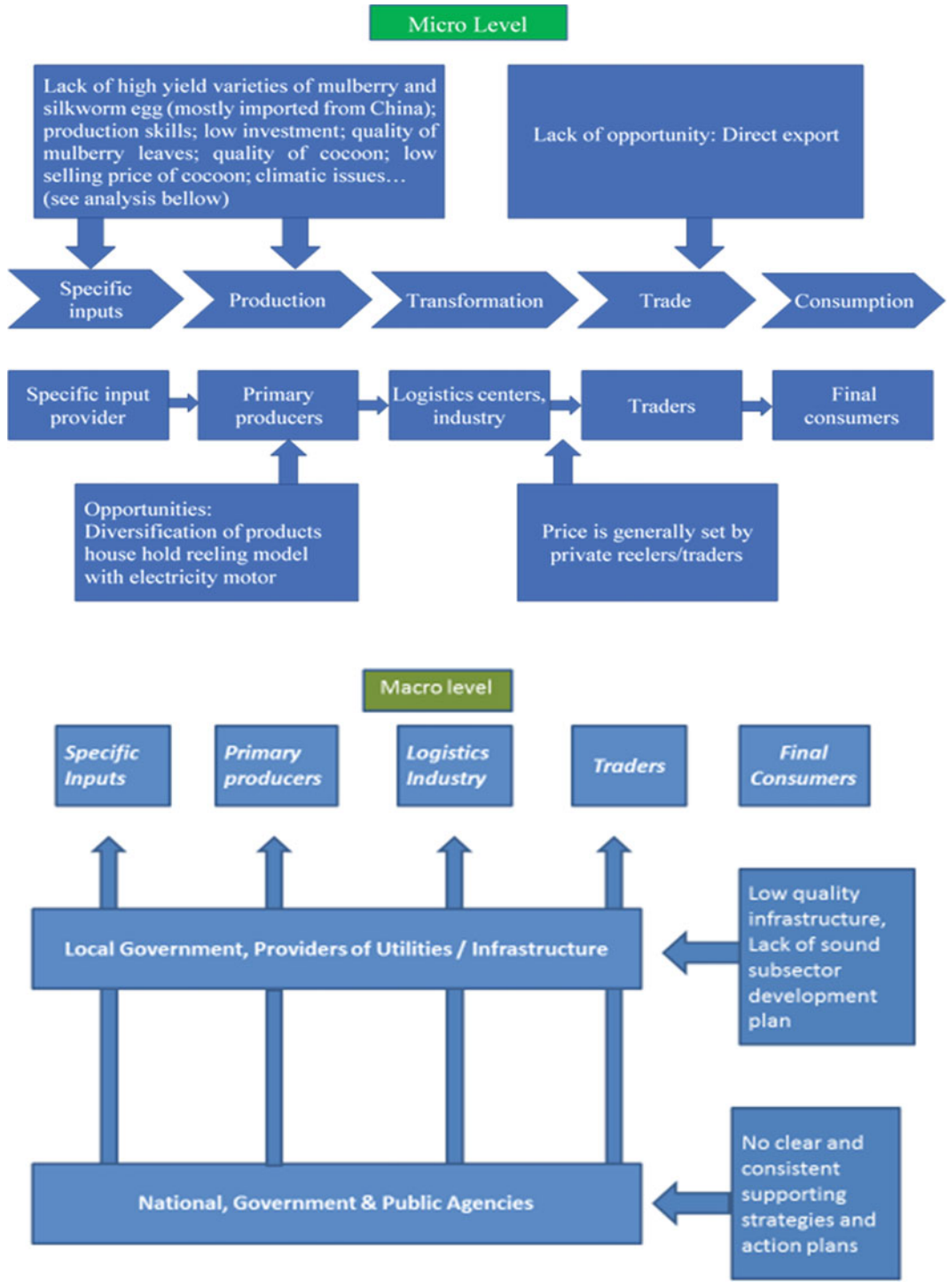


Fig. 12.4 Critical points at macro- and micro-level support institutions

Table 12.2 Mulberry cultivation cost analysis (from starting up to three years/*Bigha*)

Type of inputs	Unit price	Amount	Types of outputs	Total amount	Unit price	Amount
Land (using price/*Bigha*)	8000.00	24,000.00	Leaves	3200/kg	Tk. 5/kg	16,000.00
Land preparation	2500.00	2500.00	Fuel	Lump-sum		8000.00
Sapling	Tk. 50/100	750.00	Mix crop	Lump-sum	Tk. 5000.00/ year	15,000.00
Planting	Tk.1500/*Bigha*	1500.00	Fruit			
Fertilizer	three years/ *Bigha*	4800.00				
Insecticides	three years/*Bigha*	1000.00				
Irrigation	three years/*Bigha*	2500.00				
Weeding/pruning	three years/*Bigha*	2000.00				
Routing care						
Total amount		39,000.00		Total Amount		39,000.00

Source Field survey

Table 12.3 Mulberry cultivation cost analysis (after three years/*Bigha*) in a year

Type of inputs	Unit price	Amount	Types of outputs	Total amount	Unit price	Amount
Land (using price/Bigha)	8000.00	8000.00	Leaves	2500.00	Tk. 5/kg	12,500.00
Land preparation	00	00.00	Fuel	Lump-sum		4000.00
Sapling	00	00.00	Mix crop	Lump-sum	Tk. 0.00/year	00.00
Planting	Tk. 00/*Bigha*	00.00	Fruit			
Fertilizer	Three years/*Bigha*	1200.00				
Insecticides	One year/*Bigha*	500.00				
Irrigation	One year/*Bigha*	1000.00				
Weeding/pruning	One year/*Bigha*	1000.00				
Routing care		1000.00				
Total amount		12,700.00		Total amount		16,500.00
Profit (16,500.00–12,700.00) = 3800/12700				29.92%		

Source Field survey

- Traditional marketing chain;
- Huge amount of unemployed women in this region.

B. Weaknesses

- Inappropriate state policy (including import, tax, etc.) of sericulture development;
- Financial constraints;
- Unfavorable administrative systems;
- Inadequate HYV and local weather suitability species of silkworm and mulberry;
- Lack of modern technologies in research as well as at the cultivation level;
- Lack of equilibrium between backward and forward industries and production systems;
- Insufficient private entrepreneurship in sericulture.

C. Opportunities

- Generation of home employment opportunities for women in rural households that will empower them as income generators;

Table 12.4 Silkworm rearing per 100 DFL in one cycle

Type of inputs	Amount /No	Unit price	Total amount	Types of outputs	Unit price in Tk	Total amount
Eggs	100	2.10	210.00	Cocoon 55 kg	250.00	13,750.00
Chatai/Dala	32	100	3200/8 = 400.00	Litter		500.00
Chandrika	32	200	6400/8 = 800.00	Dead larva		500.00
$CaCO_3$	3 kg	20	60.00			
Net	60 Gauge	70	4200/12 = 350.00			
Jute, paper, etc.	–	100	100.00			
Leaves	1000	5	5000.00			
Labor	21	200.00	4200.00			
Total			11,120.00	Total		14,750.00
Profit (14,750.00–11,120.00) = Tk. 3630.00			32.64%			

Source Field survey

Table 12.5 Traditional reeling (*Kathghai*), 3.5 kg silk yarn/day

Type of inputs	Amount	Unit price	Total amount	Types of outputs	Unit price (Tk.)	Total amount
Process of cocoon	Lump-sum	1500.00	1000.00	Fine silk yarn 3.5 kg	3500.00	12,250.00
Cocoon	40 kg	250.00	10,000.00	*Matka* silk yarn lump-sum	2000.00	2000.00
Labor	1	700.00	700.00	Dead larva	Lump-sum	1000.00
Total			12,200.00	Total		15,250.00
Profit (15,250.00–12,200.00) = Tk. 3050.00			25.00%			

Source Field survey

Table 12.6 Modern reeling per 1 kg silk yarn

Type of inputs	Amount /No	Unit price	Total amount	Types of outputs	Unit price (Tk.)	Total amount
Process of cocoon	Lump-sum	250.00	250.00	Fine silk yarn 1 kg	4000.00	4000.00
Cocoon	10	250.00	2500.00	Matka silk yarn lump-sum	500.00	500.00
Labor	1	400.00	400.00	Dead larva	Lump-sum	150.00
Other material costs	6	150.00	150.00			
Total			3300.00	Total		4650.00
Profit (4350.00.00–3300.00) = Tk. 1350.00			40.90%			

Source Field survey

Table 12.7 Weaving (modern)

Inputs	Amount	Unit price	Processing cost	Total amount	Output	Unit price	Total amount
Silk yarn	1 kg	4000	3600	7600	4 *Sharees*	2250	9000
Total				7600	Total		9000
Profit (9000–7600) = Tk.1400				18.42%			

Source Field survey

Table 12.8 Designing (*Sharee*)

Inputs	Unit price	Designing cost	Total amount	Output	Unit price	Total amount
Silk cloth	2250	1000–10,000	3250–12,250	Finish product	4550–17,150	4550–17,150
Profit (4550–17,150) − (3250–12,250) = 1300–4900				40.00%		

Source Field survey

- Opportunity for additional income, especially for rural poor;
- Diversification of sericulture production by introduction of modern technologies;
- Restoring the moribund heritage of Rajshahi silk;
- Can be fulfilled the silk yarn of the country evading import dependency;
- Increase export and earning foreign currencies;
- Introducing controlled silkworm rearing systems.

D. Threats

- Government policy and planning;
- Unfavorable weather for existing species for increasing production cycles;
- Shifting trends of cultivating mango rather than mulberry.

12.4 Conclusion

The sericulture industry is an important sector for employing rural people. This study has made a SWOT analysis of the value chain of the sericulture industry in Bangladesh. It has found a big gap in the value chain of silk production. Leaves produced from mulberry cultivation need more support in the value chain. Mulberry cultivation needs long-term investment to make a profit. However, the current demand for mulberry leaves has decreased results in shifting to other crops from mulberry to get more profits. Besides, the silkworm is reared only four times a year due to unfavorable environment. Cocoon is the only output produced by the farmers but they need to get the proper price. As a result, cocoon production is gradually decreasing and it is in a vulnerable situation. The sericulture industry in Bangladesh is household-based and medium or large-scale enterprises have yet to be developed. Thus, crucial action is required to develop the silk industry in an underdeveloped country like Bangladesh. However, there is potential for environment-friendly sericulture production in Bangladesh. Thus, equilibrium development of backward and forward linkages is needed evading import dependency.

References

Akram S (2015) Analysis of the silk value chain in Pakistan. Int J Modern Trends Eng Res 2(8):223–236

Angadi BSR, Reddy M, Sivaprasad V (2013) Scope of product diversification and value creation in Indian sericulture industry. J Eng Comput Appl Sci (JEC&AS) 2(5):2319–5606

BSRTI (2014) Annual report 2014. Bangladesh Sericulture Research Institute, Rajshahi

Buhroo ZI, Bhat MA, Malik MA, Kamili AS, Ganai NA, Khan IL (2018) Trends in development and utilization of sericulture resources for diversification and value

addition. Int J Entomol Res 6(1):27–47. https://doi.org/10.33687/entomol.006.01.2069
Eswarappa K (2011) Developmental initiatives and sericulture in a south Indian village. South Asia Res 31 (3):213–229. https://doi.org/10.1177/026272801103100302
Gereffi G (2011) Global value chains and international competition. Antitrust Bull 56(1):37–56
Gereffi G (2013) Global value chains in a post-Washington consensus world. Rev Int Polit Econ. https://doi.org/10.1080/09692290.2012.756414
Gereffi G, Lee J (2016) Economic and social upgrading in global value chains and industrial clusters: why governance matters. J Bus Ethics 133:25–38. https://doi.org/10.1007/s10551-014-2373-7
Gereffi G, Lee J (2012) Why the world suddenly cares about global supply chains. J Supply Chain Manage 48 (3). https://doi.org/10.1111/j.1745-493X.2012.03271.x
Halder SR (1999) Viability of sericulture programme of BRAC: results of a cost-benefit analysis. Bangladesh J Agric Econs XXII 2:99–116
Hossain MI, Afroz S, Das M, Haque MM, Islam MS, Lim-Camacho L (2019) Value chain analysis of sunflower in coastal areas of Amtali upazila of Barguna district. J Bangladesh Agric Univ 17(2):244–250. https://doi.org/10.3329/jbau.v17i2.41989
Hui N (2010) Changes in silk production and trade structure in China after the 1980s. In: 4th Asian rural sociology association (ARSA) international conference, Legazpi City, Philippines, pp 223–235
Ponte S, Gereffi G, Raj-Reichert G (eds) (2019) Introduction to the Handbook on Global Value Chains. Edward Elgar Publishing
Jantakat C, Tangjaturasopon A (2012) Barriers of value chain for development of silk product in Nakhonchaiburin Zone, Thailand. In: 2012 International conference on economics, business innovation, Singapore, vol 38, pp 109–112
Kaplinsky R, Morris M (2001) A handbook for value chain research. International Development Research Center, Ottawa, Canada
Krishnan R, Gurung TR (2015) Sericulture scenario in SAARC region: a re-emerging industry for poverty alleviation in SAARC region synthesis. In: Gurung TR, Bokhtiar SM, Kumar D (eds) Sericulture scenario in SAARC region: a re-emerging industry for poverty alleviation in SAARC region. SAARC Agricultural Centre, Dhaka, pp 1–9
Lee J, Gereffi G (2015) Global value chains, rising power farms and economic and social upgrading. Crit Perspect Int Bus 11(3/4):319–339. https://doi.org/10.1108/cpoib-03-2014-0018
Meaton J, Abebe B, Wood A (2013) Forest spice development: the use of value chain analysis to identify opportunities for the sustainable development of Ethiopian Cardamom (Korerima). Sustain Dev 23 (1):1–15. https://doi.org/10.1002/sd.1563
Nguyen T, Eiligman A (2010) Value chain study for sericulture in PHU THO, HOA BINH, HOA and NGHE AN, Viet Nam. Joint Progamme on Green Production and Trade to Increase Income and Employment Opportunities for the Rural Poor
Porrasa I, Mohammed EY, Ali L, Ali MS, Hossain MB (2017) Power, profits and payments for ecosystem services in Hilsa fisheries in Bangladesh: A value chain analysis. Marine Policy 84(60–68). http://dx.doi.org/https://doi.org/10.1016/j.marpol.2017.06.031
Rohela GK, Shukla P, Muttanna KR, Chowdhury SR (2020) Mulberry (*Morus* spp.): an ideal plant for sustainable development. Trees For People (2):100011. https://doi.org/10.1016/j.tfp.2020.100011
Rosales RM, Pomeroy R, Calabio IJ, Batong M, Cedo K, Escara N, Facunla V, Gulayan A, Narvadez M, Sarahadil M, Sobreveg MA (2017) Value chain analysis and small-scale fisheries management. Mar Policy 83:11–12. https://doi.org/10.1016/j.marpol.2017.05.023
Ruiz A, Caballero B, Martínez Y, Vega R, Valdés A, Pérez MDC (2020) Analysis of the energy balance in the *Morus alba-Bombyx mori* system in Cuba's sericulture. Int J Agric Econ 5(1):30–35. https://doi.org/10.11648/j.ijae.20200501.14
Saikia JN (2011) Supply chain linkages and constraints in natural silk sector of Assam: a study of Muga and Eri silk. Int J Multidisc Manage Stud 1(3):167–194
Shukla R (2012) Economics of rainfed sericulture-a study in the district of Udaipur in Rajasthan, India. Bangladesh J Agric Res 37(1):49–54
Sime D, Siraj Z (2020) Sericulture in Ethiopia: Production status, opportunities, challenges and potential areas. A review. J Entomol Zool Stud 8(6):1–10
Sturgeon TJ (2001) How do we define value chains and production networks? IDS Bull 32(3):9–18
Sujatha B, Reddy PL, Babu MAS, Reddy BAP, Kumar S, Naik SS (2015) Socioeconomic factors influencing the adoption levels of new Sericulture technologies by different farming groups in Anantapur District of Andhra Pradesh. Int J Agric Ext 3(2):149–153
Tesfa A, Ejigu K, Yetayew A, Assefa H (2014) Assessment of value chain of sericulture products in Amhara region, Ethiopia. Int J Environ Eng Nat Resour 1 (2):61–69
Uddin MT, Goswami A, Rahman MS, Dhar AR, Khan MA (2018) Value chain of pangas and tilapia in Bangladesh. J Bangladesh Agric Univ 16(3):503–512. https://doi.org/10.3329/jbau.v16i3.39448