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**LAND PRODUCTIVITY, ARTISANAL EFFICIENCY & INCOME
GENERATION IN ARTISANAL SILK INDUSTRY OF WEST BENGAL**
(With Special Reference to Sericulture Sector in Malda District)

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Abstract

Sericulture, being low capital intensive with low gestation period and assured returns, suits a vast marginal class including landless farmers and low-skilled artisans, whose voices are not heard in the so called fast growing world. This paper will focus on some pertinent regional issues of land productivity and technical efficiency of these marginal classes and will measure their plausible impact on income generation from the artisanal silk sector of West Bengal. Analysing the nation wide data set, the paper finds the area of mulberry cultivation and price of reeling cocoons as significant influencing variables. However, primary survey on Malda district of West Bengal exposes that mandays creation for the this avocation and technical efficiency are two significant factors which are significantly enhancing the income flow produced by the sericulture household while cost of implants has a serious detrimental impact on revenue generation by the silk artisans in West Bengal.

Keywords: Sericulture, Income generation, Raw-Silk, Poverty, Income-Inequality, Migration

JEL Classification: R 20, R 30, O15, Q12

1. Introduction

Sericulture, being a low capital intensive agro-based industry, generates a continuous stream of income within rural India throughout the year. Along with the allied activities it ensures secured livelihood to more than 7.5 million persons in and across 59 thousand villages over India (ISC, 2014). In the face of rising poverty and inequality with the impact of globalization, sericulture has become one of the promising and ideal rural income generating sectors due to its minimum gestation period, less investment requirement and maximum employment generating potential with quick turnover.

In the post globalization period, when the major allegations against the development procedure is that it hardly includes the marginal section of the rural sector, sericulture unambiguously ensures an avocation to those semi-skilled poor peasant-artisans whose struggle for survival has become challenged in the face of exclusionary level of development. In order to overcome this economic and social exclusion in the fast changing globalizing world, a high-level ECOSOC (United Nation's Economic & Social Council) Ministerial Meeting was called at Jeneva on July, 2007. It was inferred through the discussion that if growth and development were to accelerate and lead to a faster pace than poverty and hunger, a major effort is needed to generate productive employment. Therefore productivity is one of the important criteria which were assigned as a poverty reducing agent.

This paper will deal with the impact of productivity as an income generating factor in the artisanal silk sector of West Bengal. In one of his earlier studies, Lakshmanan (2007) showed that West Bengal being one of the principal originators of silk-industry in country has successfully raised its raw silk production during 1980-2004 with a positive annual growth rate of 4.16 percent and the annual growth in mulberry area during the same period has been 1.83 percent, which implied a growth in land productivity with the passage of time. This higher growth in level of raw silk production compared to that of mulberry cultivated area is also indicative of a vertical growth of sericulture in West Bengal instead of horizontal extension. Sericulture is practiced in few concentrated regions of West Bengal compared to other traditional silk producing states (e.g., Karnataka, Andhra Pradesh, Tamil Nadu and Jammu & Kashmir) which is evidential from its highest number of sericulture families per village ratios (i.e., 48.9% in West Bengal). In Karnataka, Andhra Pradesh and Tamil Nadu, sericulture activity is more dispersed through out the state which is reflected through its sericulture families per village ratios, i.e., 14.29%, 13.32% and 5.26% respectively (CSB, 2003). Therefore spatial concentration is a special characteristic of West Bengal which would lead to the development of a specific region due to this livelihood.

In the post globalised era (1991- 2010) rural income and employment generation has received top priorities to combat with increasing trend of inequality and poverty (Misra, 2010). In sericulture, the entire range of activities generate a moderate flow of income and creates employment opportunities for a substantial section of low skilled marginal rural inhabitants who would otherwise remain unemployed or disguised employed in vast agricultural sector. The entire sub sectors include (i) Silkworm Rearing Sector; (ii) Cocoon Sector; (iii) Post Cocoon Sector. These sectors are farm-labour based and fall under the cottage and small scale sector. In silkworm seed sector, mulberry cultivation

creates employment on farm. The silkworm rearing sector uses mulberry leaves as input and this creates large scale employment and income earning capacity for the family of mulberry growers (Eswarappa, 2009). Reeling activity is mainly undertaken in rural or semi-urban areas and that also generates a stream of income and employment. Thus the artisanal silk industry creates large scale income generation opportunities in the rural and semi urban areas accelerating the economic growth of the area. The objective of this paper is to derive whether this income generation is translated into increase in land as well as labour productivity. We will illustrate the national scenario in the beginning to measure the nature of association between input productivities (specifically land and labour) and income generation in order to assess whether the employment generation is productive or not. Then we will focus on regional analysis, specifically on the sericulture-rich districts of West Bengal. We will initiate our analysis explaining the time series trend and will try to determine the influencing factors which usually influence the income generation through sericulture during the period of globalization and afterwards. Eventually we will test our hypothesis i.e., whether input productivities have any significant role to influence the process of income generation during that time horizon. In the core section we will strive to verify our nation based result with the field survey result done on the Malda district of West Bengal. Our primary survey data has been collected from nine sericulture rich villages of Kaliachak Blocks in Malda district. Malda having 74 percent production share occupies the leading rank in the state of West Bengal where Kaliachak blocks are enriched in sericulture and silk reeling, which justifies the reasons of choosing this region as primary survey area.

Sericulture in West Bengal still remains an unimproved rural based activity dependent on low-skilled labourers, compared to those of other traditional silk producing states like Karnataka and Andha Pradesh mostly due to their productivity differentials. Experts in this field opined that there exists a significant gap in productivity at farmers' level and yield potential in West Bengal (Bagchi et.al., 2008). Major reasons for low acceptance of the technologies were identified as inadequate linkage between scientist and farmers which are not being in consonance with the farmers' need and compatibility with the total farming system. Corporate entry in this sector is still a distant dream and the authority support is at barely low level much from its deserving threshold which resulted into this productivity gap at farmers' level and yield level. The obvious outcome becomes exodus of sericulture-artisan from the sector and looking for alternative employment opportunity.

However, the opportunity lies with this sector is in its income effect associated with the large section of downtrodden artisans who could in turn generate a large spillover effect over the society as a whole. Low gestation period and quick turnover makes sericulture ideal for poor and marginal rural inhabitant. Poverty and income inequality can be harnessed if expansion of sericulture can be sustained in the rural sector. It has been observed that in sericulture 57% of its final value is flown back to the primary producers¹. Again according to Mattigatti (2000) the price spread of sericulture goods accounts 48.4% for the mulberry farmers-silkworm rearers, 17.7% goes back to reelers & twistors and 12.3% goes back to weavers and dyers. Thus sericulture supports in promoting the growth of income level of the excluded group and justifies our

prioritization of analysis in the realm of creating productive improvement and income generation.

2. Productivity led Income Generation in Sericulture: A Literature Review

Income generation at regular intervals inspires the low skilled poor farmer-artisans to adopt sericulture along with other cultivation of crops in India. A vast literature in this specific areas have been found in literature, where several researchers from different parts of the country derived the same conclusion, i.e., sustainable income generation capacity of sericulture always fares better than other alternative food or cash crops. Kumaresan and Prakash (2001) selected few areas of Tamilnadu to make a comparative income analysis of mulberry crops vis-à-vis other competing crops like, paddy, sugarcane, turmeric, gingelly and groundnut in that area. The crops cultivated other than mulberries are all annual crops with the life duration varying from 3 months to 12 months, while the production nature of cocoon involving mulberry cultivation and silk worm rearing, is different from that of other crops. Labour was the chief input in the production of mulberry leaf which occupy around 42percent of the cost share in mulberry cultivation. Farm manure and fertilizers were the other major cost component in cultivation of mulberry. Labour was the prime input in silkworm rearing too. It occupies around 55% of the total rearing cost. Therefore, as a whole they explained the share of labour cost in total leaf production and rearing cost is 50 percent. Given this situation if the labour productivity is raised the consequences of that rise would be reflected on the rise in level of income generation. The study also revealed 'net income' and 'benefit-cost ratios' of mulberry crops vis-à-vis other crops². According to the study revenue obtained from sericulture was comparatively higher than all major crops except Turmeric-sorghum / gingelly. Addition to that, mulberry-cultivation requires comparatively less area of land for farming and comparatively low graded-land is able to generate good productivity which ultimately turns into good profitability. Therefore we can infer that sericulture is cultivated with using more land-productive technology.

Similarly at Virbarha region in Maharashtra a study was conducted in two villages by Hajare, Jadhav et al (2008) to find out the economic viability of sericulture across other crops like paddy, soyabean, and sunflower. The comprehensive report of their study reveals that sericulture has its edge over other crops, when flow of income generation is the consideration for sustenance of any crop³. Though Khobana and Dhapewada was not the traditional belt of sericulture in Maharashtra, mulberry proved its higher productivity (i.e., land productivity) with consistent income generating potentials. The mulberry crop efficiently utilized sub-soil moisture of deep soils in dry period and its income started after three months of plantation with optimum production from second year onwards and sustained income continued up to 15-20 years. In marginal lands with protective irrigation, farmers fetch higher returns from sericulture than other traditional crops and also generated employment for more than 170 days. Therefore productivity is not only higher in terms of greater output but also with use of inferior lands.

The beneficial outcome of this productivity led income generation flows more in favour of the farmers and artisan group whose assembly line location is much lower in this vertically integrated silk industry. According to Sinha (1989), roughly 30 percent of the

value of a printed silk saree is added by the primary cocoon producer whose location is almost at the bottom stage of the entire silk industry. The silk processing accumulates value of 10 percent or more and 12.5 percent is accrued by the weaver leaving 22.5 percent to the printing. Thus total cost of production accrues to 75 percent while 25 percent is accrued by the traders. Thus sericulture has the potential to steer pro-poor growth in a developing economy. According to another study report by Vijayakumar (Raman et al., 2007), out of total share of income distribution in the sericulture sector, 54.6 percent share is captured by primary producers like farmers, silkworm growers. Unlike other vertically integrated industry there is no trickle-down but flow-down effect in this sector. They illustrate how despite being the early staged contributor in the production process, the share capturing capacity of the farmers ameliorates the condition of the rural poor in the country. The study infers the percentage share of income earned by the farmers, traders, reelers & twisters and weavers are 54.6, 17.8, 15.3 and 12.3 percentages respectively⁴. The average income of silkworm rearers or farmers depends upon the area of land holding, rearing of silkworms, technology adoption and available infrastructure. The study shows that they get a substantial income of Rs 15,000 to 20,000 per year, if they strictly follow the advocated technologies in time. In tropical states of the country, the silkworms are reared through out the year and the income flow will be round the year and at regular gaps. Mulberry cultivation by farmers and cocoon production by rearers create a large scale employment for family members in the rural India. Most of the times it has been found that rearers have their own field of mulberry cultivation. However, there are also instances of non-mulberry growers taking up cocoon production alone as full time occupation (Eswarappa, 2000). They buy leaves from mulberry growers and use them as raw material for cocoon production. Therefore in their cases the income generation will be related more with labour productivity instead of land productivity.

The reeling activity involves a large semi-skilled labour force in rural or semi urban areas. The income generation opportunities emerged through this sector helps to combat the rural poverty on one hand and prevent the involuntary migration of rural people to the urban areas on the other (Gangopadhyay, 2008). Now, this poses a relevant research question as prevention of rural to urban migration may lead to surplus labour in agrarian sector whose consequential impact would be disguised unemployment and decline in labour productivity.

According to a survey conducted by CSRTI, Mysore (Benchamin et al., 1987), sericulture provides direct employment of 19 lakh persons in the year 1985-86, out of which 11 lakh mandays were devoted to sericulture and another 8 lakh mandays to post-cocoon process. Indirect employment, according to the study, amounts to one-third direct employment so that 25 lakh could be devoted to the activity. Thus 11 lakh persons of man-days generation are possible through various allied activities of sericulture⁵. Kumaresan et al., (2008) shows that in India, sericulture operations are confined to small and medium scale farms mostly with the holdings ranging from 0.5 acres to 2 acres. The small and marginal farmers are more associated with sericulture because its inherent labour intensive technology and the need of adequate personal care required for silkworm rearing operations. This automatically ignites the age-old debate, i.e., farm-size and productivity. It has been observed through several studies that the nature of operation

makes it suitable for small farmers only, both in terms of productivity and cost efficiency. The cost of production of cocoon was more for the large farmers (Rs 100.61 / kg of cocoon) than that of small scale rearers (Rs 93.48/ kg of cocoons). Large scale farms produce less quantity of cocoons bearing almost same level of expenditure due to problems in management. As a matter of fact, the expenditure incurred on labour by the small farmers was comparatively more than that of large scale rearers. But that labour force is mostly family labours, which protects the small scale rearers against high market wage rate on one hand and make their process of production more care intensive on the other. The studies conducted by Hanumappa and Erappa (1985), Lakshman et al (1998), Kumaresan et al (2001) also indicated more involvement of family labour. High returns to family labour and efficient management in silkworm rearing are the key aspects of success for small-scale Sericulturists. Small-scale silkworm rears obtain better yield and thereby obtained higher revenue from sale of cocoons and generation of by-products than their larger counterpart.

Analyzing the cost inefficiency factors of the Large Scale Rearers, it has been found that cost intensive inputs such as farmyard manure and fertilizers escalate the cost price of the large scale operators. Dependence of hired labour and higher market wage rate also act as a stimulating factor for cost acceleration. From the decomposition analysis of cocoon production, it has been found (Kumaresan et al, 2008) that the income gap between large scale rearers and small scale rearers with respect to cocoon production was attributed to technology difference and management practices. This means the small-scale farmers adopt better technique of production. Moreover, small scale rearers normally rear silkworm in small or medium sized rearing houses in which adjustment of temperature and humidity can be easily controlled. Again with the help of family labour, the small farmers could provide timely feed for silkworm and maintain hygiene in silkworm rearing. This has also been evidenced when deviation in rearing practices due to non-availability of labour or work pressure adversely affect the yield performance. Kumaresan et al. (2008) has shown that despite earning lower profit compared to its smaller counterpart, the large farm remains economically viable only due to its favourable cost-benefit ratio (1:1.48).

Dhane and Dhane (2004) explained the income generation process of the silkworm rearers, are threatened by some significant supply-side constraints, which includes several types of inefficiency starting from technological inefficiency, cost inefficiency, labour inefficiency and market inefficiency(including both product market and factor market) like (i)Inadequate availability of silkworm rearing equipment; (ii)High cost of construction of rearing Houses; (iii) Expensive rearing appliances and materials; iv) Knowledge constraint specially in respect of adoption of new technology; (v) Constraints regarding marketing of cocoons, (vi) Lack of credit facilities for construction of rearing room; (vii) Unavailability of subsidy for rearing silkworm; (viii) Difficulties in identifying diseases of silkworm; (ix) Lack of protection facilities of silkworm from diseases; Their study also reveals that caste and social participation of the respondents have a highly significant relationship, while knowledge of the farmers have significant relationship with constraint faced by them in sericulture. The other characters such as sericulturist's age, education, family size, available family labour, land holding, irrigated

land, and experience in sericulture and information source did not have any statistically significant relationship with the constraint faced by them in sericulture.

There also exists some conventional reservation among the farmers that acts as the barriers in the path of income generation. Large farmers irrespective of their size of holding keep their irrigated fertile land for food-crops. Only marginal and reclaimed land was taken up under mulberry in the initial stage. Cattle grazing have been found to be one of the important difficulties in sericulture. Indian Tribal and Cattle grazing farmers confine their cattle only in the rainy season. After the harvest season they loose their cattle, which pose menace to mulberry plantation. Besides the relative low productivity of cultivable land the large farmers also face above type of externality issues within their own group which inhibits their income growth in sericulture and reinforces the inverse relation between 'farm size and productivity'.

Eswarappa (2000) has shown another dimension of labour productivity which is responsible for the income generation in sericulture in the villages of Andhra Pradesh where the traditional occupational patterns in the villages have been dismantled. Caste hierarchy has been demolished by the lower caste as sericulture has brought all the groups in a level playing ground to compete with each other. This is a new dimension of labour productivity growth which helped in generating income growth in sericulture. However, he has also mentioned that regarding the utilization of benefits, upper caste people still maintain their traditional advantage over education.

Comparatively less significant research work has been done regarding income generation issues in sericulture in West Bengal. Ali et al. (2008) have worked over the mulberry cultivation pattern of Malda district in West Bengal and revealed a grimy picture. They have commented that technological inefficiency has blocked the income generation growth in sericulture, where scarcities of underground water and unpredictable rainfall have enhanced the problem for mulberry cultivation. The quantity and quality of mulberry leaves produced by the majority of the farmers in the district remains sub-standard. They commented that productivity led growth is possible through introduction of high yielding varieties, application of fertilizers and irrigation. De Sarkar et.al. (2013) have shown how sericulture can be used as a tool for economic development in Malda district. They estimated the income generation through silk reeling in Malda district during 2008, 2009 and 2010 was Rs.11.16 crore, Rs. 14.80 crore and Rs. 24.08 crore respectively. Thus income generation has almost been doubled through sericulture in Malda district.

3. Objective & Methodology

A gap in research work on income generation issues in sericulture has been observed by the authors, especially during the phase of post globalization period (1990-2000). Period of globalization has shaken the sericulture sector in all traditional silk producing states, including West Bengal. The annual growth rate of silk production has abruptly declined in all leading states including West Bengal mainly due to inflow of cheap silk yarn in the market. But the first decade of the present century (2000-2010) has experienced a revival in growth pattern of those industries almost through out the nation where performance of West Bengal is better than all other leading states. This drives our research interest to find

out the significant production or income generating factors in West Bengal. From the angle of microeconomic foundation our hypothesis is the Income Growth in sericulture of West Bengal can be attributed to (i) Land Productivity, (ii) Artisanal Efficiency, (iii) Technological Efficiency and (iv) Change in Price of Raw Silk. We want to determine how much of this income growth is productivity led.

Tracking the existing lacunae on productivity improvement and rapidly filling up could be another aspect from the end of the authority which especially boost up the income growth in sericulture sector in this post globalization phase. This paper intends to shed some light in that arena too.

We will initiate our technical analysis through studying the trends of Income generation from raw silk, reeling cocoon and silk fabrics at National level. It will be studied with the help of secondary level data published by the Central Silk Board as well as DGCIS, Calcutta. Then we will concentrate over the same issues on West Bengal. As analytical tool we will hinge on diagrams and CAGR (compound annual growth rate) to compare and study the growth patterns between pre-and post globalization phases.

West Bengal being the major study region the analysis will delve into cross-section study of sericulture household living in Malda district. Malda produces 74% of state production and therefore it can alone captures the nature and composition of income generation of the state as a whole. We would like to determine whether productivity (both land and labour) has any role to play in the income generation. We have chosen few sericulture rich villages of Kaliyachak Blocks as mulberry cultivation in Malda district is mostly localized in Kaliyachak-I, Kaliyachak-II and Kaliyachak-III blocks comprising 90% of the total mulberry cultivation area. Kaliyachak-I itself occupies 61% of the total cultivated area under mulberry in the district (See Ali et al., 2008). Twenty percent of total sericulture farmers of the district live in this block (Official Statistics, Deputy Director Malda, 2010). Stratified random sampling is done to choose nine sericulture rich villages namely, *Marupur, Alipur, Sujapur, Bakharpur, Gayes Bari, Chasapara, Mothabari, Debipur, Jotkabil* from Kaliachak block-I & II. Twenty to twenty five households involved with sericulture activities have been chosen on an average from each village using stratified random sampling. Thus total 212 households constituted the sample size of our study. Respondents (who are silk artisans) were randomly taken from those sericulture rich villages and were asked several questions regarding their livelihood and income generation. Simple linear regression technique will be used using OLS method to estimate few equations formed on the basis of our a priori hypothesis. We intend to test whether income generation is significantly influenced by land productivity, labour productivity, technological efficiency or it is due to administrative price support (in order to counter the balance of Chinese dumping).

4. Income Generation Trends in Indian Sericulture: Pre & Post Era of Globalization (1983-2011)

Globalisation of Indian economy in 1991 virtually reduced and removed barriers between national borders and free flow of silk and silk yarn has eroded the position of domestic industry. Reeling industry was hard hit as the Chinese silk yarn was both costs efficient

and qualitative. According to a study report (EXIM, 2002) India imported raw silk from various sources to meet its requirements for production of silk fabrics. These imports were necessary to meet domestic as well as export demands for various silk products. In 1990-91, the domestic sector contributed around 89 percent while 11 percent demand of silk fabrics industry was mitigated by imports. By 2001-02 this import share in total raw silk availability in the country raised to 21.2 percent. This rising trends in import dependence in turn affects large section of sericulture farmers and artisans and that spoils their process of income generation through sericulture. The cheap raw silk import not only reduced the domestic price of reeling cocoon and raw silk but it also offset the impact of factor productivities on income generation from sericulture. The year 1994-95 has recorded highest import of raw silk in India when 27 percent of domestic silk demand is met by imported raw silk. (See Table-1)

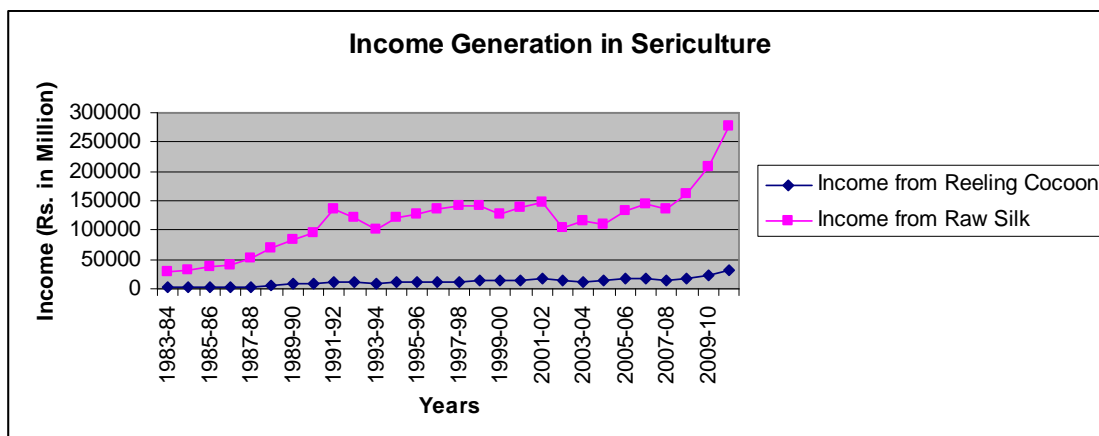
Table 1: Import Share in Domestic Consumption in Post Globalization Decade (1990-2001)

Year	Domestic Raw Silk Production (MT)	Raw Silk Imports (MT)	Import share in Domestic Consumption (%)
1990-91	12560	1598	11.29
1991-92	11763	2076	15.00
1992-93	14168	2768	16.31
1993-94	13691	4892	26.33
1994-95	14579	5403	27.04
1995-96	13909	4149	22.98
1996-97	14126	2911	17.09
1997-98	15236	2346	13.34
1998-99	15544	2827	15.39
1999-00	15214	5008	24.75
2000-01	15857	4713	21.96
2001-02	18395	4950	21.20

Source : Central Silk Board , Bangalore

The raw silk (whether domestically produced or imported) is transformed to soft-silk by dyeing and printing on it and ultimately the silk-fabric is being sold as a final product to the consumers in the market. Since the research interest of this study is confined within land productivity and artisanal efficiency in silk industry, the vertical spectrum of silk industry above the production of raw silk is beyond the scope of study of this paper. Again raw-silk is placed in higher assembly-line than reeling cocoon in the vertical spectrum of the Industry. Therefore it can be assumed that value of raw silk is inclusive of the value of reeling cocoon. Comprehensive and simultaneous data on price and output of raw-silk is available for 1983-2011 from secondary source (CSB, 1999, 2003, 2003, 2007, 2012). We will dissect the data into two phases (i) Pre Globalization Period; (ii) Post Globalization Phase.

Fig 1: Income Generation Trends in Sericulture in India (1983-2011)



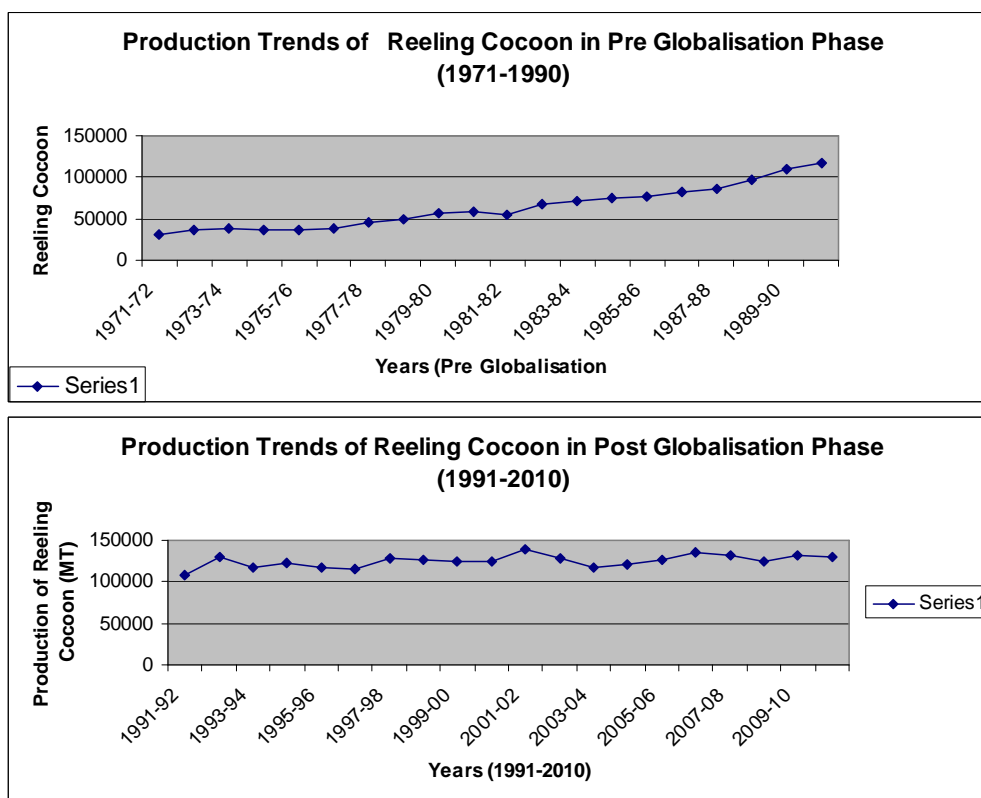
Source : Central Silk Board, 1999, 2003, (online data)

The comprehensive trends of income generation both from raw silk and silk cocoon including pre and post liberalization period is depicted in Fig-1. Value of reeling cocoon production which reflects the income of mulberry growers and silkworm rearers has maintained a more or less steady horizontal trend without much fluctuation compared to that of raw silk. Value of raw silk is basically accrued to silk reelers. Now if we focus on the production growth pattern of reeling cocoon in pre liberalized period (1971-1990) we observe an annual growth of 7.06 % of reeling cocoon while the post-globalisation phase only experiences 1.05% of annual growth rate in production of the same. Now our point of analysis is whether this declining trend in production is due to globalization or the productivity related issues are also hidden with that. Growth in raw silk production in post globalization phase (1990-2010) indicates our increasing dependence on imports (specially on China) which we have stated earlier. However the land productivity growth and labour productivity growth within 1995-2010 is 5.19 and -0.82 percent annually. The land productivity reflects technological efficiency (like high yielding mulberry seeds, fertilizers) is effective but that fails to raise the production level in desired target. Negative labour productivity implies accumulation of greater numbers of labour force in the sericulture sector. Therefore higher employment is not indicative of greater prosperity. Higher amount of labour force with little amount of production of raw silk would actually result in further immiserization. Poverty is the definite outcome of this negative productive led growth. This lowering of growth rate coupled with negative labour productivity unambiguously signifies destitution of the reelers in the country. Sericulture farmers and reelers in the country have often observed to launch nationwide protest against duty-free import of raw silk from China. The sericulture farmers always express their fear that liberal imports would always result in crash in prices of the cocoon as well as raw silk in the domestic market and hence their income generation would be stunted.

Fig 2 (a) & 2(b) reveal the contrast production trend of reeling cocoon in the pre and post globalization period. The sericulture peasants in the country have faced this crisis in growth of production on one hand and on the other hand globalisation has produced more marginal labours whose dependence declined the average productivity and intensified the poverty in the sector.

Fig 2 (a)& (b): Production Trends of Reeling Cocoon in Pre & Post

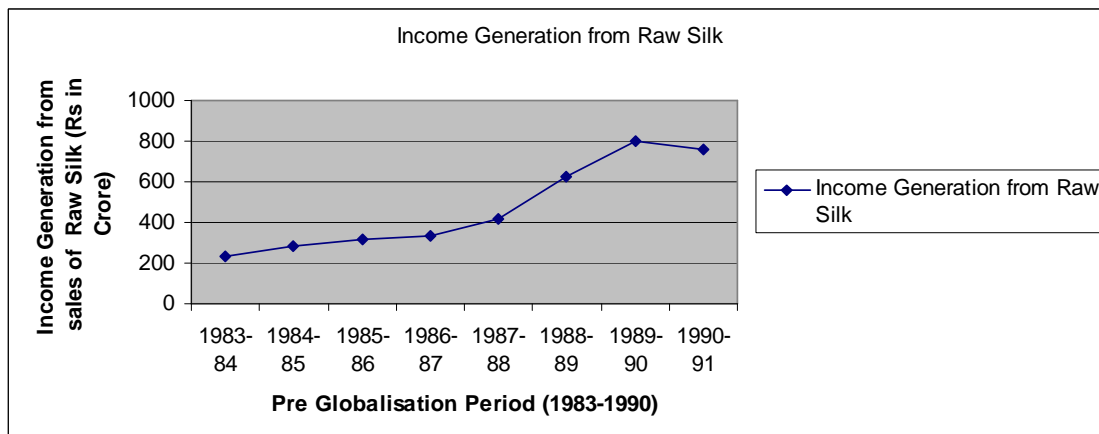
Globalisation Phase



The income generation through sales of raw silk, on the other hand, has maintained a positive rising trend with 18.1% of annual growth rate in income in the pre-liberalization period (i.e., during 1983-1990) (See Figure 3-a), while slight fluctuating income generation path is observed during 1990-2005 (See Figure 3-b). Fluctuation in income generation path could not be attributed to ups and downs in production trend during this period (see Fig 4-b) but due to fluctuating time-path of the price of raw silk during the same period (see Fig 5-b).

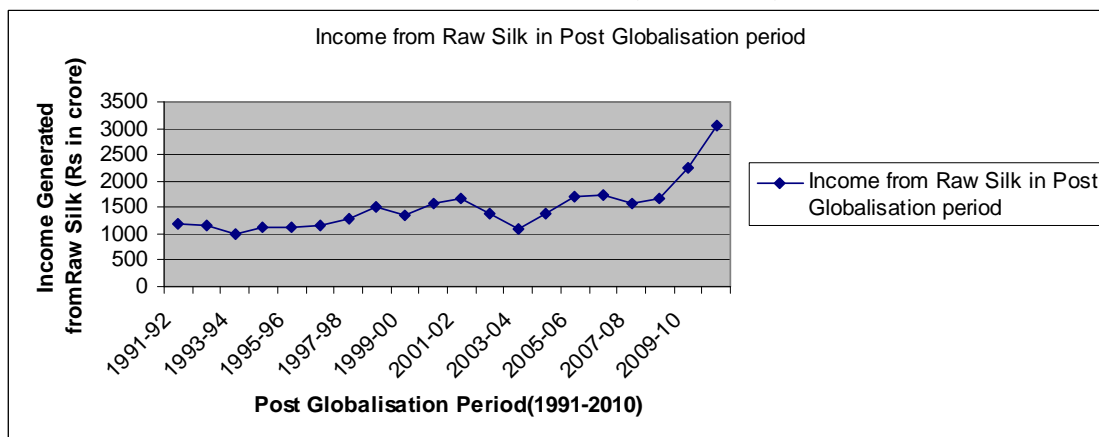
From the year 2005 onwards the income generation in sericulture has taken a positive trend (see Fig- 3b). The year 2005 is benchmarked as abolition year of Multi Fiber Agreement (i.e., the quota constraint faced by the developing economies to export their textile and readymade garments to developed nations). The post globalization phase as a whole experiences an annual growth of 5.1% in income generation from raw silk which is substantially lower than that of pre-liberalisation era. This signifies how the globalization has hit the production cum income generation of the cocoon and reeling sector. Therefore whether production of reeling cocoon and raw silk is adversely affected by low labour productivity and cheap flow of importable silk (cocoon, yarn, raw-silk) in post globalisation period in India, that needs to be tested.

Fig 3 (a): Trends of Income Generation through sales of Raw Silk in Pre Liberalization Period (1983-1990)



CAGR (1983-1990) = 18.1% growth in income generation from raw silk

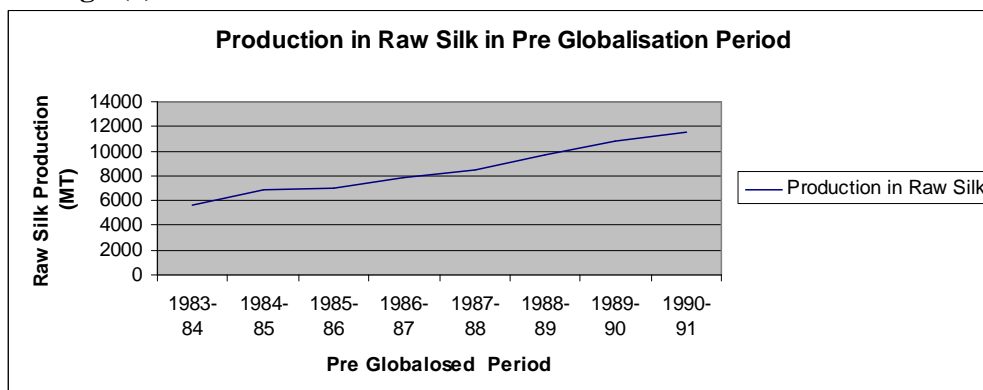
Fig 3 (a): Trends of Income Generation through sales of Raw Silk in Post-Liberalization Period (1991-2010)



CAGR (1990-2010) = 5.1% growth in income generation from raw silk

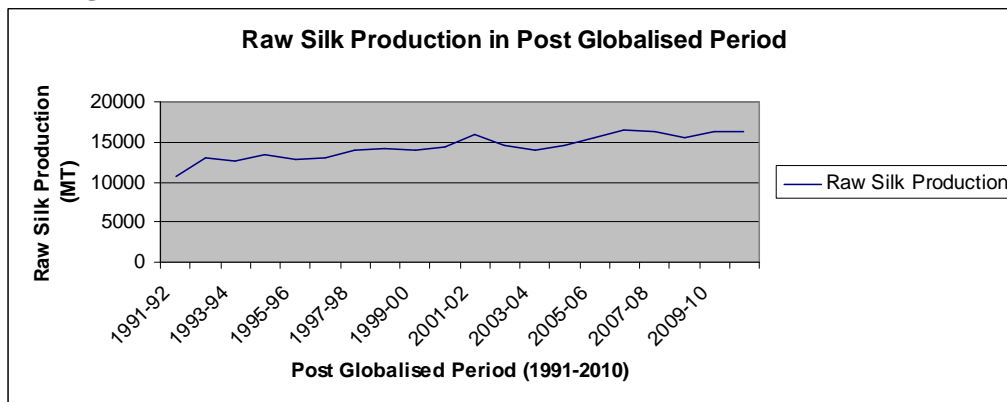
Now, if we concentrate on the trends of raw silk production between pre and post globalization period we can experience the similar growth pattern. It exhibits a growth rate of around 10.58% in the pre liberalization period and 2.28% in post liberalization period.

Fig 4(a): Trends in Production of Raw Silk in Pre Globalised Period



CAGR = 10.58%

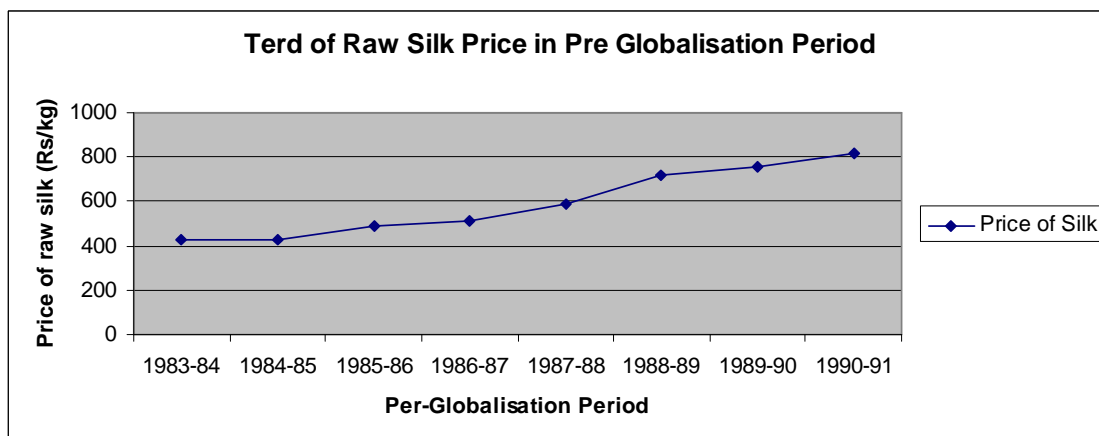
Fig 4(b): Trends in Production of Raw Silk in Post Globalised Period



CAGR = 2.28%

The price of raw silk similarly exhibits the similar trends. In post globalised phase, the price is being governed by competitive international prices which pulls down the rising trends of domestic prices of raw silk. This justifies why the rate of growth of raw silk prices in post globalization phase is lower (2.7%) than the previous phase (9.8%). However, the rising trend in price of raw silk is observed from 2005 onwards, which is benchmarked for abolition of MFA. Abolition of MFA actually increased the market of the developing economies in developed market, which shifts Chinese focus from Indian market to other developed market. India remained significant importer of raw silk in the world during the phase of post globalization sharing 17.06 percent of global import in 1995 and 28.5 percent during 1999. (See Table -1) and in 1999, around 44.85 percent of Chinese Raw Silk Export was destined to India (EXIM Bank, 2002) [See Exim Bank of India (2002) : India Silk Industry - A Sector Study, Occasional Paper No. 90, March 2002, pp 21; Data collected from a paper presented by China Silk Association at ISA Congress, Bangalore]. This enormous volume of silk was exported at a much lower rate (US \$ 19.65/tones) than it was exported to the developed destination like Italy (US \$ 21.15) and Japan (US \$ 21.66). All these keep a downward pull in prices of raw silk during the phase of post-globalisation. We have experienced rally against these Chinese dumping in several times in these post globalization phase. Before 1998, Chinese yarn was restricted to the exporters against their entitlement related to their actual exports. Permission of silk yarn by Indian Government from Oct 1998 onwards led to a 30 percent fall in domestic prices of reeling cocoons and silk yarn (Tikku, 1999).

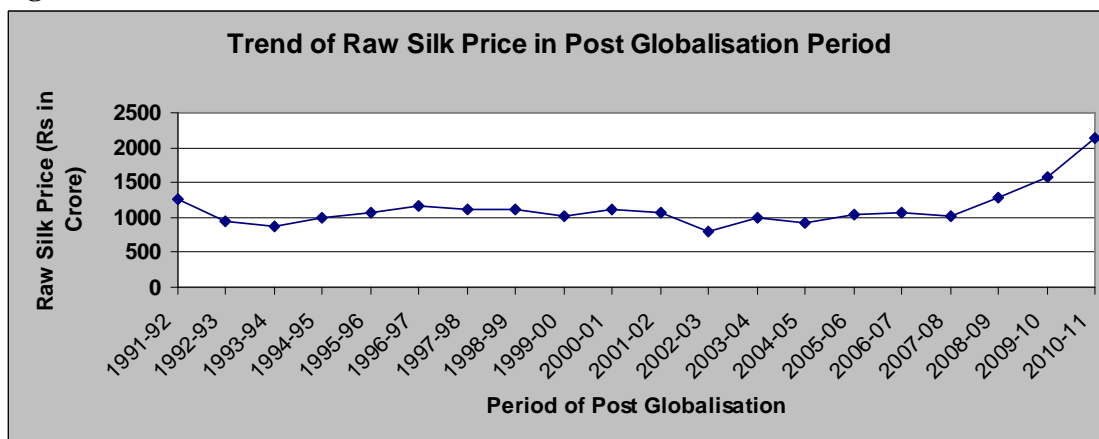
Fig 5 (a) : Trends of Raw Silk Prices in Pre Globalisation Period (1983-1990)



CAGR = 9.8%

This rate of fall in prices have been aggravated to 40 percent during 2000 and 2003 when imported price of Chinese raw silk fell from US \$ 24.5 /kg to US\$ 13.5/kg. This disrupted the domestic prices of raw silk and reeling cocoon. The farmers and reelers were most affected segments due to increase in volume of cheap imported silk. Dumping of Chinese silk was established and the Government of India imposed anti-dumping duty for the international silk grade 2A or below in the year 2003 and that was effective for the period of five years. China cleverly handled this issue and started exporting twisted yarn and silk Garde above 2A (Ministry Textiles, 2005). The silk rearers and reelers were worst affected by these rise in imports of raw silk with undercut prices.

Fig 5 (b) : Trends of Raw Silk Prices in Post Globalisation Period (1991-2010)



CAGR = 2.7%

A sunset review has been taken up for continuation of anti-dumping duty on import of raw-silk in 2008. Accordingly anti dumping has been further continued with an enhanced reference price of US \$ 37.32 per kg and this has been effective upto Jan 2014. All this measures boosted the artisanal industry of India as it shows a reviving period of growth during 2001-2010.

With the abolition of MFA, China has also found expanded developed market to export their silk and silk product which ultimately boils down to lowering the growth rate of Chinese raw silk import in India. Rise in price level has saved large section of poor

peasants and artisans whose sole livelihood rests on income generation through selling of reeling cocoons and raw silk.

Table 2: Trends of Raw- Silk Import from China

Years	Price (Mn US \$)	Price (Rs in Cr)	Volume of Import (MT)	Share of Chinese Raw Silk in Total Import
2006-07	143.63	649.90	5318	95.6
2007-08	180.64	727.38	7839	98.9
2008-09	194.78	895.78	8316	99.0
2009-10	192.43	913.07	7097	96.7
2010-11	199.27	907.86	5519	95.2
2011-12	213.85	1024.79	5159	90.9

Source: Central Silk Board (Indian Silk, Annual Report 09-10, 10-11, 11-12)

The production trends in raw silk may depend upon host of factors like area of mulberry cultivation, amount of reeling cocoon production, price of reeling cocoon as well as amount of raw silk imports. Analysis the available time series data on mulberry area, amount of reeling cocoon production and others we can deduce the correlation of those parameters with income generation through raw silk.

Table 3: Degree of Association of Income Generation of Raw Silk with other Factors

Factors Associated with Income Generation from Raw Silk	Correlation Coefficient	
	Spearman R	Kendall R
Price of Reeling Cocoon	0.92**	0.813**
Import of Raw Silk	0.579**	0.397**
Mulberry Area	-0.217	-0.148
Reeling Cocoon Produced	0.805**	0.661**
Number of persons employed	0.512*	0.412*
Labour Productivity	0.754**	0.640**
Price of Raw Silk	0.95**	0.847**

* significant at 0.05 level, ** significant at 0.01 level

Except mulberry cultivated area, all other factors- price of reeling cocoon, import volume of raw silk, quantity of reeling cocoon production and number of persons employed through sericulture bear a significant positive correlation with income generated by raw silk. Indian silk industry has excess demand for raw silk. The volume of production falls short of volume of demand or consumption. Therefore import volume is expected to raise the level of income generation in artisanal silk. On the other due to increase in level of land productivity (through using high yielding variety mulberry seeds, better technology and improved silk hybrid) the income generation and land area possess negative relation. This is what we call vertical extension of industry. Reeling cocoon whether in terms of price or quantity sold, bear a direct relation with income generation from raw silk. Chinese dumping in the first decade of globalization depresses the domestic price of reeling cocoon and thereby income generation of raw silk was also affected. Lastly the persons associated with the industry, most of who belong to the large agricultural area possess a direct relation with income generation through raw silk.

Fig- 6 Growth in Land Productivity of Raw Silk (1980-2010)

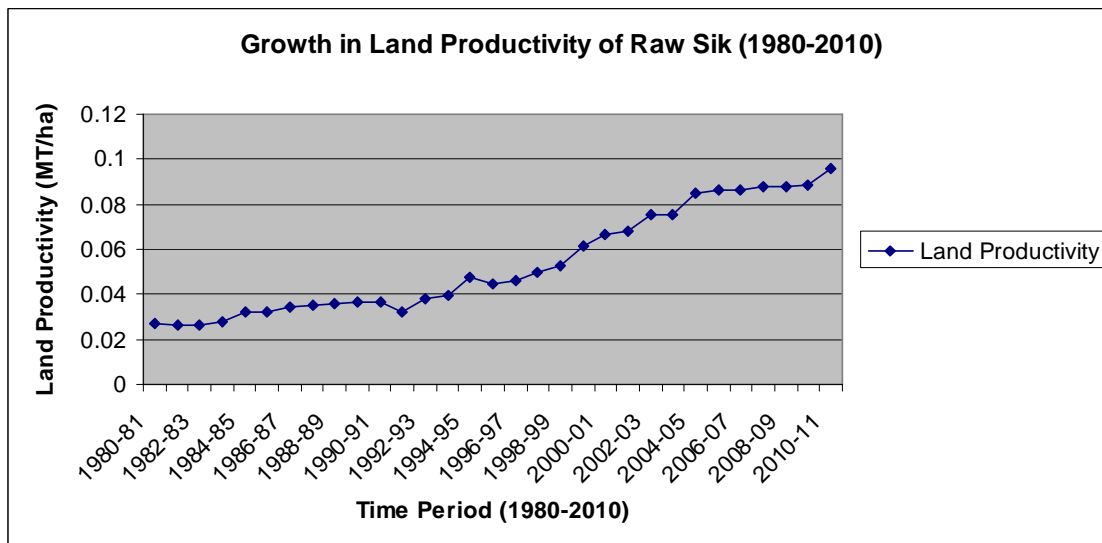


Fig 6 : Growth in Labour Productivity in Raw Silk (1980-2010)

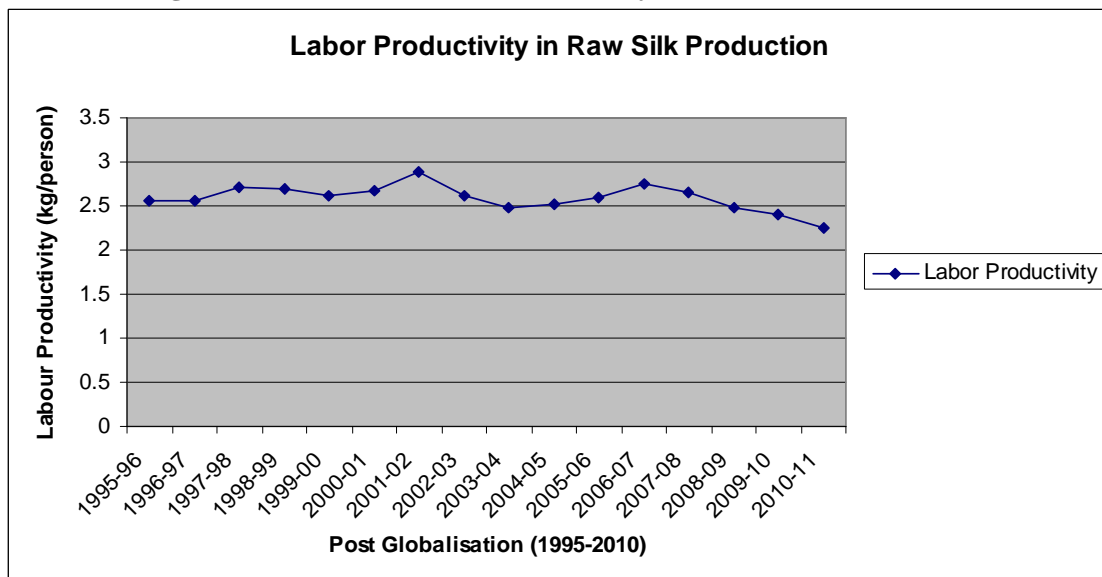


Fig 7: Growth in Income Generation in Raw Silk (1983-2010)

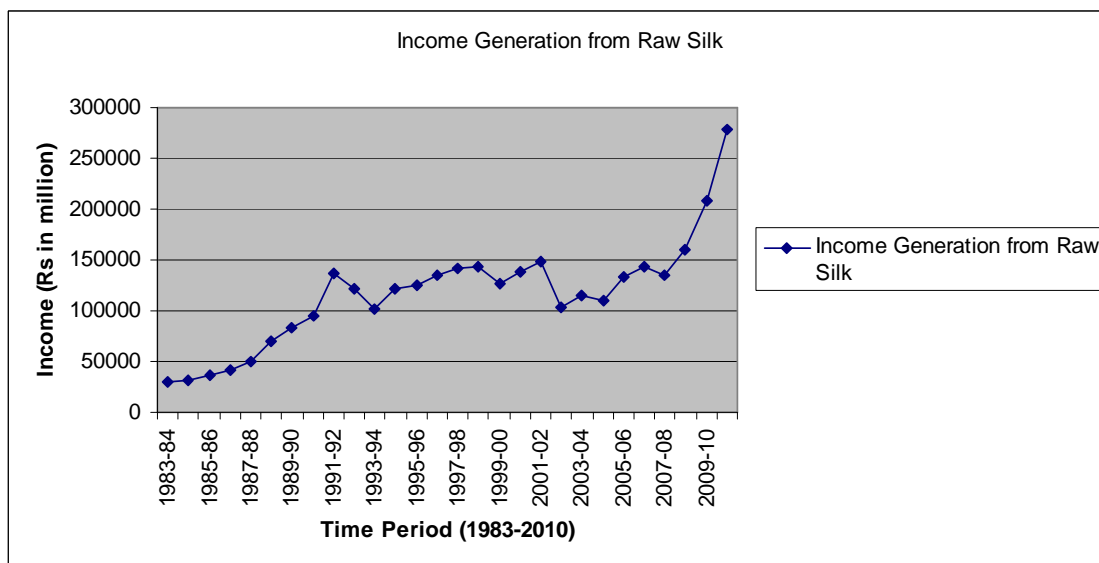
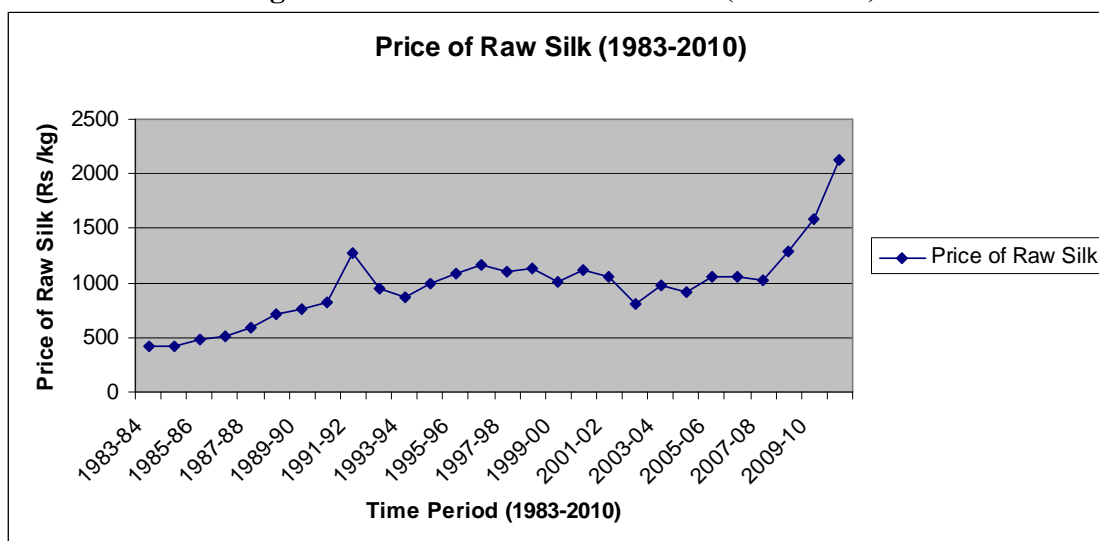


Fig 8: Growth in Prices of Raw Silk (1983-2010)



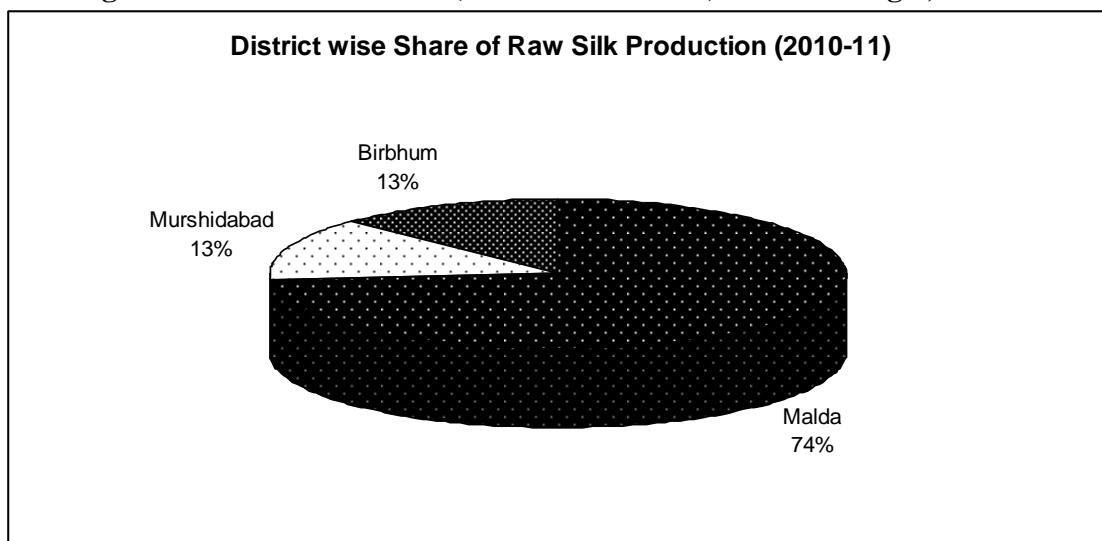
5. Fluctuations in Income Generation by Artisanal Silk Industry in West Bengal in Post Globalisation Period

The trends of income generation from sericulture at national level in the post globalization period have helped us to determine the sensitive factors which have a strong association with the import quantity of raw silk and price and output of produced reeling silk in different parts country. This section will specifically deal with the income generation trend in sericulture of West Bengal, which is also the focus region of our analysis. In West Bengal sericulture is historically clustered around few districts where backward and tribal people have practiced this livelihood over generations. The strange fact is that the entire gamut of sericulture which involves rearing, reeling, weaving and trading are not evenly allocated in each silk producing district. For instance Malda is

renowned for raw silk production and reeling, but beyond this artisanal work the district is not specialized in further value-added chain in production. Similarly Murshidabad is famous for silk weaving rather than production and reeling. Malda, Murshidabad and Birbhum jointly produce around 99 percent of state raw silk and reeling cocoon (Directorates of West Bengal Sericulture, 2011). Within this producers-trio, Malda is the dominant leader producer in mulberry raw silk and reeling cocoon. It produces around 74 percent share of the state raw silk

The issue pertinent with our analysis is the impact of globalization in this artisanal silk industry. We have seen that the long hands of globalization did not leave its grip from this traditional industry. The cheap silk yarn from China, Korea and Japan flooded this regional market in 2003 which resulted into sharp decline in the price of reeling cocoon. Malda cocoon market witnessed a steep decline in the rate of cocoon from Rs.100/ kg to Rs. 40/kg within two years (Saeed, 2003) [Saeed Muhammed (2003): Technical Barriers to Trade- Cheap Silk yarn Imports threatens Bengal Farmers, *The World Trade Review*, Vol No. 3.(6)]. The huge inflow of exotic high grade silk yarn from China at a very low price level (which was buffeted by hidden subsidy) had in-turn uprooted a large portion of mulberry cultivation and 30-40% of mulberry field were planted with mango trees (Deputy Director Reeling Malda, 2005).

Fig 9: Raw Silk Production (District wise share) in West Bengal, 2010-11



Malda district contributes 70% share of the state production in raw silk and 7% share in national production, according to 2002-03 statistics profile of West Bengal. Sericulture is the main stay of local people dwelling over this Gangetic plain.

Fig 10: District wise Growth in Mulberry Raw Silk Production in West Bengal (2001, 2010)

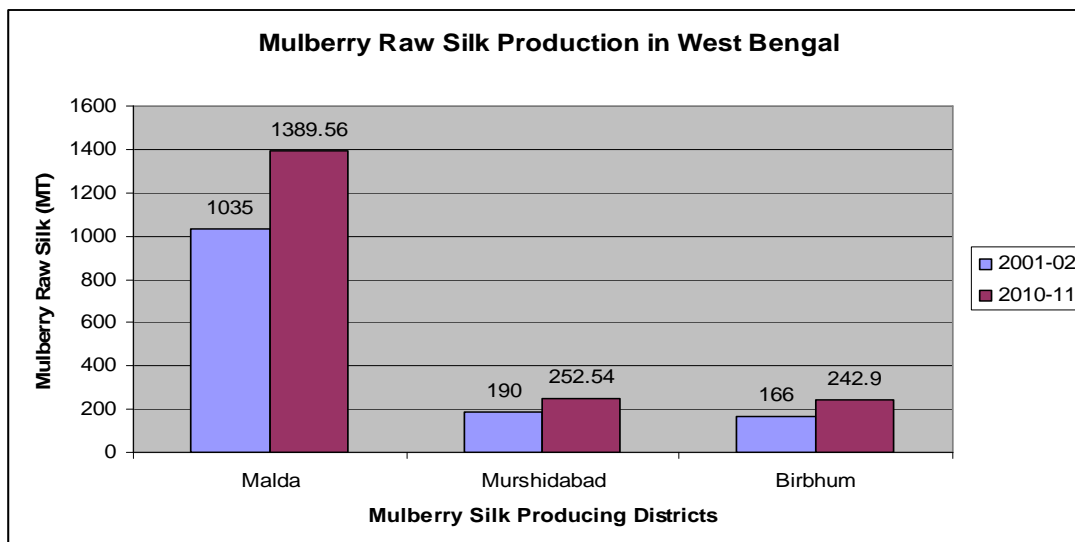


Fig 11: District wise Growth in Mulberry Reeling Cocoon Production in West Bengal (2001, 2010)

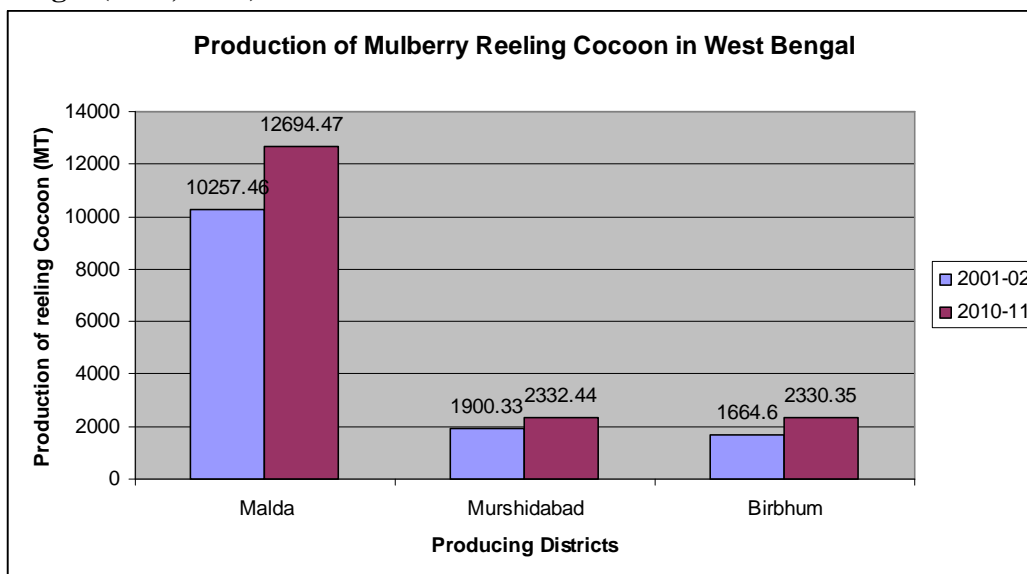


Table 3: Status & Annual Growth of Sericulture in West Bengal during 2002-2010

	2002-03	2010-11	CAGR (%)
SERICULTURE VILLAGE	2339	2080	-1.45
NO. OF SERICULTURE FARMERS/ARTISANS	110000	92200	-2.18
GRAINAGES	16	22	4.06
TSC (TECHNICAL SERVICE CENTRE)	59	59	0
COCOON MARKET	12	12	0
SILK EXCHANGE	2	2	-0
REELING UNIT			
Charka	4163	322	-27.38
Cottage Basin	3330	2987	-1.34
Multi End Reeling Machine	18		-100
		4755	
SLIK HANDLOOM	18621	19045	0.28
SILK POWERLOOM	128	128	0
WEAVERS	122000	27260	-17.08
CO-OPERATIVE SOCIETY	127		-100
MULBERRY AREA(ha)	12569	32467	12.59
MULBERRY RAW SILK PRODUCTION	1450	1885	3.33
REELING COCOON PRODUCTION	15171	17525	1.82

5.1 A Case Study in Malda

In this section we propose to construct two different models, one with continuous predictors and other with continuous and categorical predictor. We have selected two sericulture villages from Kaliyachak block in Malda District, which are predominantly rich in raw silk production. From two villages sixty respondents were randomly chosen and the answers received from them against our survey-questionnaire have helped us to carry out the analysis. Applying OLS on the income generation equations the coefficients are regressed. The estimated coefficients are illustrated in Table 3.

Table 4: Coefficient Table

Dependent variable: *Income from Raw Silk*

Estimated Coefficient	Model-1	Model-2
Constant	6053.36	20335.59**
Man-days	46.217 (12.14) **	43.389 (11.43)**
Wage Share of Male Worker	47.824(48.48)	42.096(48.35)
Cost of Implements	-54.361 (46.37)	-88.346 (43.97)*
Credit Received (by Silk Artisan)	0.11 (0.42)	- 0.019 (0.39)
[Age=0]* [Technical Access=0]	-	-11820.4 **
[Age=0]* [Technical Access=1]	-	-12137.0*
[Age=1]* [Technical Access=0]	-	-11133.1**
R Squared	0.41	0.536
Adjusted R Squared	0.37	0.467
F (df)	8.82(50)**	7.77(47)**

** sig at 0.05 level; * sig at 0.01 level;

Interpretation of estimated coefficient of model-1

This model deals only with continuous variables and the significant F-statistic ensures about the ‘goodness of fit’ of the model. Adjusted R-Squared indicate that 37% data variations of income generation can be explained by the data variations of the assumed explanatory variable. The estimated coefficients highlight two important points. The first is regarding the statistically significant relation between ‘mandays’ and ‘Income generation’. One day rise in working days can raise the level of income by 46 units. However, rise in cost of implements may reduce the level of income by the sericulturists.

Interpretation of estimated coefficient of model-2

This model deals with continuous variable as well as categorical predictors (or dummy variable) and running OLS in glm (general linear model) we find statistical significance i of interaction effect between ‘age’ and ‘technological access’, along with other significant influence of the continuous variable like, ‘man-days’ and ‘cost of implements’.

We assume the age of the principal earner in the household as ‘0’ when he is found young (which means more productive) and below 45 years of age, while ‘1’ otherwise, when he is found more experienced but less productive. In this situation his role would be one of knowledge (which she gains through experience) transformation.

On the other hand, technological access would be assumed as ‘0’ when no basic training is received by at least a member of the household and ‘1’ otherwise.

The significant relationship between (age)*(technological access) indicates,

- (i) Addition in 'young but untrained labour unit' in household actually earns less than Rs 11,820.40 amount annually, compared to 'trained and matured labour unit' in household.
- (ii) Addition in 'trained but young labour unit' in household also earns less compared to that of 'trained and matured labour unit' by Rs 12,137/= amount annually.
- (iii) Similarly, addition in 'untrained matured labour unit' in the household also earns less relative to 'matured and trained labour unit' in the household by Rs. 11,133/= amount annually.

This comprehensively reveals that maturity / experiences and technological access are more return generating compared to any other combinations.

The continuous variables, man-days and cost of implements bear a significant statistical relationship with Income. Rise in man- days by one day have the capacity to raise the annual income level by Rs 43.39, while rise in cost of implements/machinery may reduce the annual income by Rs. 88.35 amount.

6. Conclusion

The income generation process in rural sericulture has revealed the dynamism of the process of earning within the rural inhabitants. Area of mulberry cultivation and price of reeling cocoons have been deduced as significant explanatory variables for upward rising slope in the 'income generation curve', while price of raw-silk and import quantity as well as export earnings are responsible for growth in silk fabric income and silk fabric production respectively. In other words, we can say both imports of raw silk and export earnings of silk industry influence the silk-fabric production in statistically significant way. Our primary analysis in the most sericulture rich district of West Bengal exposes that number of man-days generated from different phases of silkworm rearing actually influence the total income generation, which is very much logically justified. Similarly cost of machineries and implements have a detrimental effect on income generation and matured and technologically enriched labour force can always generate higher level of income compared to all other matching alternatives.

Concluding section calls for certain policy suggestions. Under the Directorate of Sericulture certain annual targets are adopted by the planners. However, problem lies in regional bias outlook, which made the sericulture popular and prospective in Karnataka only. Income from sericulture as a whole depends upon area of cultivation, price of reeling cocoon, price of raw silk, import quantity and export earnings. However, studying the variables in West Bengal we find only number of mandays can help to raise the level of income generation from sericulture. A more intensive approach in balanced development can help to remove this regional bias. Sericulture is becoming a dying industry in West Bengal, while its prospect is rising at national level. Farmers, whose generation based expertise is helping the industry to sustain despite regional ignorance, should be encouraged with institutional help. Then only we can expect the level of inclusive development would encompass the poor artisans through the income generation process of sericulture.

Notes

1. See Gangopadhyay (2008): Silk Industry in India: A Review Indian Science & Technology; NISTDS, CSIR, New Delhi;
2. See Kumaresan et al, (2001) Comparative Economics of Sericulture with competing crops in Erode district of Tamil Nadu, *Indian J. Sericulture* , Vol40, No2, P-142-146
3. See Hajare et al, (2008) *Indian Silk*, Vol 46, No 9, January 2008
4. See Anantha Raman et al , (2007) Feasibility of Human Resource Development for Sericulture in India- A Review, International Conference on Sericulture Challenges in 21st Century, Sept 2007, Vratza, Bulgaria
5. Benchamin et al (1987) Employment Generation and Income Generation in Rural Areas through Sericulture, *Indian Silk*, XXV (June)

References:

- Ali Ersad, Saha, S and Parveen S. (2008) Present scenario of Mulberry Cultivation in Malda, *Indian*
- Anantha Raman, K.V., Phaniraj, H.S., Amarnath S., B. Sarathchandra(2007) : Training, Feasibility of Human Resource Development for Sericulture in India – A Review, paper presented at International Conference on Sericulture Challenges in 21st century, 18-27Sept, 2007, Vratza, Bulgaria.
- Banerjee, D. (1990) Silk Production in West Bengal : A Case of Stunted Commercialization,
- Banerjee, D. (1995) Market and Non-Market Configurations in Rural West Bengal, *Economic & Political Weekly*, Nov 25, 1995, M135-M-142.
- Benchamin K.V. & Nagaraj C.S. (1987) An Appropriate Sericulture Technique, ed by M.S, Jolly, 5 *CR&T*: Mysore, pp-69-90.
- Benchamin, K. V. & Jolly, M.S. (1987) Employment and Income Generation in the Rural Areas through Sericulture, *Indian Silk*, Vol XXV(June).
- Census of India (2001) Primary *Census Abstract*, New Delhi, Planning Commission.
- Central Silk Board (1986) *Statistics Biennial*, CSB, Ministry of Textiles, Govt. of India.
- Central Silk Board (1999) *Compendium of Statistics-1999*, CSB, Ministry of Textiles, Govt. of India.
- Central Silk Board (2003) *Sericulture & Statistics -2003*, CSB, Ministry of Textiles, Govt. of India.
- Central Silk Board (2010) *Annual Report-2010*, Ministry of Textiles, Govt. of India.
- Chelladundi, A (1999) “Employment Generation in Sericulture”, *Khadi Gramodyog*, 38(1) 20-22.
- DGCIS, Kolkata (2007, 2011) Latest Sericulture Statistics in India, (online available at <http://indiansilk.kar.nic.in/rti/CO/SericultureStatisticsInIndia.pdf>)
- Dhane V.P & Dhane A.V. (2004) Constraints Faced by the Farmers in Mulberry Cultivation and Silk - Worm Rearing , *Indian Journal of Sericulture*, Vol 43(No.2),155-159.
- Eswarappa, K. (2000) Development Challenges due to Sericulture – A Study in Chitoor District , an unpublished M Phil Dissertation submitted to University of Hyderabad.
- Eswarappa, K. (2009) Socio-Cultural Dimension of Sericulture – A Village Study from Andhra Pradesh, in M. Moni and Suresh Misra (eds) “*Rural India : Achieving Millennium Development Goals and grass roots Development*” , Concept Publishing Company, N Delhi, 298-313.
- Eswarappa, K. (2010) Ethnography of Sericulture: An Anthropological Study, *South Asian Studies*, January – June, 2010, pp 241- 257.
- Gangopadhyay, D. (2008) Silk Industry in India- A Review, Indian Science & Technology; *NISTDS- CSIR*, New Delhi;
- Government of Andhra Pradesh (1993-94) A Note on Implementation of National Sericulture Projects in Andhra Pradesh (*Summary & Progress*), *Department of Sericulture*, Hyderabad.
- Hanumanappa & Erappa (1985) Economic Issues in Sericulture: Study of Karnataka, *Economic & Political Weekly*, Vol XX, No 31, Aug 31, 1985.
- Hazare T. N. & Jadav (2008) : Sericulture Brings Better Income, *Indian Silk*, Vol: 46, No-9.
- ITC Silk Review (2001) : <http://www.intracen.org/> accessed on 12th January, 2014.

- Kumaresan & N.B. Vijaya Prakash (2001) Comparative Economics of Sericulture with Competing crops in Erode District of Tamil Nadu, *Indian Journal of Sericulture*, Vol.40, No. 2, pp 142-146.
- Kumaresan P (2002) Quality of Silk Production – Some Economic Issues, *Economic & Political Weekly*, Vol 37, No 39 , Sept 28, 2002, pp 4019-4022.
- Kumaresan P, Geetha Devi R G, Rajadurai S, Selvaraju N.G & Jayaram H. (2008) : Performance of large Scale Farming in sericulture - An Economic Analysis, *Indian Journal of Agricultural Economics*, Vol 63, No.4, Oct-Dec, 2008.
- Lakshman & Geetha Devi (2007) : TamilNadu – Employment Opportunities in Sericulture , *Indian Silk*, Nov, 2007.
- Lakshman S, Jayaram H, R Ganapathi Rao, B mallikarjuna & R G Geetha Devi (1998) : Manpower Utilisation in Mulberry Sericulture : An Empirical Analysis, *Manpower Journal*, Vol 33, pp 49-63.
- Lakshmanan S. (2007) : Growth Trends in Mulberry Silk Production in India – An Economic Analysis, *Financing Agriculture*, July-August, 2007.
- Mattigatti, R; G. Srinivasa, M.N.S. Iyenger, R.K.Dutta and R.G. Geetha Devi (2000) : ‘Price Spread in Silk Industry- an economic analysis’, *Indian Journal of Sericulture*, Vol 39, No.2, pp 163-64,
- Misra Roli(2010) Impact of globalisation on rural employment (1983-2008), *Indian Economic Journal*, 58 (3), October-December, 2010
Occasional Paper, No 124, CSSS, Calcutta.
- Radhakrishna P G, B M Shekharappa, V G Manibashetty (2000) : Silk and Milk : An Economic Package for rural Upliftment, *Indian Silk*, September, 2000.
Silk, Vol. 47, No.6, Oct 2008, pp 4-7.
- Sinha, S. (1989): Development Impact of Silk Production – A Wealth of Opportunities, *Economic and Political Weekly*, Jan 21, 1989.
- Thangavelu, K. (1993) : Lacunae in Indian Sericulture, *Indian Silk*, Aug, 1993.
- Usha Rani, J. (2007) : Employment Generation to Women in Drought Prone Areas : A Study with Reference to the Development of Sericulture in Anantapur District of Andhra Pradesh; *Journal of Social Science*, 14(3), P-249-255.