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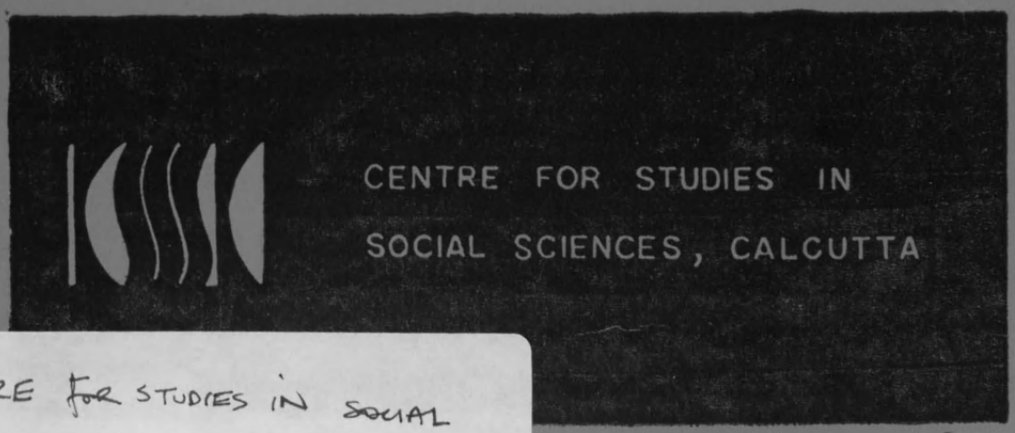
SILK PRODUCTION IN WEST BENGAL : A CASE OF STUNTED COMMERCIALIZATION

DEBDAS BANERJEE

JUNE, 1990



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Abstract

Silk production in West Bengal maintains a low profile despite its high profitability. The usual tools of analysis while emphasise relative prices and 'information' as the key factors in the reallocation of resources overlook the conditions of reproduction in underdeveloped markets. Land gives highest yield in India and that too under rainfed condition, the knowledge of the cultivation, at least, in its traditional form is widely known, the linked activities are also developed with respect to skill, yet the forces of growth are often reflexed. This study tries to argue that the phenomenon is reflective of the underdeveloped nature of capitalism in agriculture, in general.

Silk production in West Bengal : a case of stunted commercialization

I. The Problem

Data show that the profitability in sericulture is much higher compared to any generally practised crop - production in West Bengal (see Section II). This wide margin between the cost of production and the price (Table 1) has been prevailing for quite a long period. The 'supply and demand' theories suggest that the relatively high rate of profit in this sphere of production is only a temporary phenomenon. As all the factors of production fetch the same effective prices in all the 'activities' the market forces would automatically lead to an optimal allocation of resources and thus would equalise, demand remaining constant, the 'partial' rate with the general rate of profit. In other words, the relative prices determined in exchange being looked upon as the driving force behind change (see North, 1981). But what intrigues is that despite high profitability the magnitude of growth remained substantially low. In this section, I shall try to postulate the conditions of reproduction in the light of the theoretical understandings of growth in the agricultural sector. Data would appear here more in the form of illustration. Section II deals with the specific characteristics of sericulture and their representations in shaping the nature of cultivation in the specific conditions of reproduction in West Bengal.

Silk production, including sericulture, consists of a chain of activities viz., mulberry cultivation, 'seed'/ commercial cocoon rearing, reeling, spinning/twisting, and weaving. In this study we will be concentrating on the stages of production upto reeling. In terms of 'yield per unit' the mulberry plants, silkworms and the reeling equipment could be broadly classified into (a) traditional, and (b) hiyielding/ hybrid, or modern. The word 'modern' would be appropriate to describe the filature reeling as opposed to traditional charka or 'kat-qhai' (popularly called) reeling. There is another type of reeling known as cottage basin reeling which is an improved version of the traditional charka reeling.[1] Hypothetically, we can conceive of the following six different combinations of the traditional and modern methods of cultivation, rearing, and reeling :

Combination	Sector 1 Mulberry leaf	Sector 2 Rearing	Sector 3 Reeling
I	T	T	T
II	T	H	T
III	T	H	Filature
IV	H	H	T
V	H	H	Filature
VI	H	T	T/Filature

/~Where, T = Traditional, H = Hi-yielding/Hybrid 7.

The available information allow us to classify the mulberry cultivators, in West Bengal, into three groups, as follows :

(a) small cultivators who put all, or the major proportion of land under mulberry and the rest under paddy;

(b) middle cultivators who have sizeable land under mulberry while the greater part of the owned lands remains under other crops including paddy; and

(c) big cultivators whose area of mulberry-lands constitutes an insignificant proportion to the total cultivable land owned by them.

There is, in general, no market for mulberry leaf in West Bengal. The cultivators of mulberry, in turn, are themselves the cocoon rearers in most of the cases. Almost all of them own the means of production. The next stage, i.e., / rearing though / is highly labour-intensive activity the small, and, to a great extent, the middle cultivators depend solely upon own family-labour including women. However, to note, most of the cultivators belong to group (a), and partly to group (b). The marginal presence of the big landowners, in general, is conspicuous.

The class division in which one segment of the population produces surplus while the other by dint of the ownership of the means of production appropriates the surplus is not the 'rule of the game', in general, in this sphere of economic activity. On the other hand, the producers have

differential access to the means of exchange. A fully commercialized exchange or competitive market exchange is yet to develop. What is apparent is a partially commercialized, noncompetitive exchange administered by trading capital through a hierarchy of intermediaries. The traders' role in production through the system of advances, or, in other words, the 'interlinkages', however, is marginal.

Marx characterized growing commercialization — reflecting the dissolution of feudal forms and relations and a simultaneous advance towards capitalist relations — by a number of features, such as : commutation of rent in terms of money, the displacement of crop-sharing tenancy by cash rents, a larger degree of monetization of outputs and inputs (i.e. of the proportion of inputs and outputs purchased or sold), increased area under cash-crops or a larger proportion in output of cash-crops, the rapid increase in the number of landless labourers, advance of productive forces mediated through the expanding circuit of commerce, etc. (Dobb, 1963; Bharadwaj, 1985). The process of commercialization entailed the simultaneous development of 'free' exchange relations in the markets of land, labour, capital, and outputs, in the 'classic case' of capitalist development in England.

The studies on the slow process of commercialization in India quite often refers to the phenomenon termed as 'interlinked markets' (Bharadwaj, 1974; Bhaduri, 1985). A dominant party conjointly exploits the weaker parties in two or more markets by interlinking the terms of contracts.

For instance, the land-labour interlinkage implies that the landlord stipulates, as a part of the tenancy contract, attachment of labour services which are underpaid or unpaid. As corollary, the underdevelopment or muted formation of a capitalist market inhibits the formation and growth of a capitalist market in another (Bharadwaj, 1985). However, Bardhan and others (see articles in Bardhan, ed., 1989) try to argue that the potential benefits of interlinked transactions are undeniable. 'Marxists often cite some of these production relations as institutional obstacles to development in a poor agrarian economy, overlooking the microeconomic rationale of the formation of these institutions. Under a set of informational constraints and missing markets, a given agrarian institution (say, sharecropping) may be serving a real economic function' (Bardhan, 1989 : 7).

The market for sericulture output is dominated by a (trading) class who, in general, not engaged in the sphere of production. Thus, the phenomenon of 'interlinked markets' is not quite apparent so far as the output market is concerned. The markets for cocoons, silk yarn, etc. are dominated and controlled by the traders who operate a collusive oligopoly despite the lukewarm presence of government agencies. There are three principal agents who procure cocoons for reeling : (a) local intermediaries; (b) government filature units' agents -- government agencies themselves; and (c) private small reelers. And, there are two principal agents who procure silkyarn for delivery at the weavers' site : (a) the local intermediaries; (b) weavers' cooperative societies. It is found that the local intermediaries offer much less

prices for the products compared to the others. It is also interesting to note that the local intermediaries pay higher prices than that their principals offer to the primary producers.

We are unable to gather that the producers face difficulties in marketing increased volume of output which implies that there is no rationing of the volume of output to be transacted by each producer. Thus, for the free and risk-neutral producers there is no cost involved in searching for high-paying buyers provided all the three agents were there in the village. However, in the absence of government agents at the village level a transaction cost due to transportation is involved in cae the producers are willing to sell to the government agencies. It is also reported that some of the government agencies take a longer time to pay for the procured outputs. Thus, essentially the producers have to compare, if they were free, between the prices offered, primarily, by the two agents taking into account those factors. Assuming that the local intermediaries do not buy on credit the relationship between the two sets of prices is as follows :

$$P_i^P \leq P_i^G + T_i + r^t v_i \quad \ldots\ldots\ldots\ldots (1)$$

where, P_i^P = Local intermediaries price for i-th product; P_i^G = Government agencies' price for the i-th product; T_i = Transportation cost; r^t = Nominal interest rate for the period 't'; $v_i = P_i^G$ x volume of output sold to the government agencies.

When equality of (1) holds it may be argued that the private local intermediaries are essentially providing an economic function, and the producers' choice of selling to them is voluntary. But when the L.H.S. is less than the R.H.S. and still the local intermediaries are the bulk purchasers of the output we could hardly assume that there exist bilateral contracts among individual actors. In fact, each agent may deal with several producers but each producer cannot deal with several agents. And contracts are not reached through bilateral bargaining (cf. Zusman, 1989).

Whether or not the equality of both sides in equation (1) holds the private intermediaries would like to retain the market in their control. If they foresee any attempt on the part of the government agencies extending their procurement services to the village or local level they would immediately offer higher prices, and thus would try to maximize the gross turnover. In this sense, effective public intervention by bringing in competition is likely to benefit the producers.

A system of determining the prices of cocoons has been initiated in West Bengal on the basis of the Japanese concept 'Kakeme'. The Cocoon Collective Purchase Committee fixes up the Kakeme in every season, which becomes obligatory for the Silk Khadi Societies and the government reeling units but not for any private reeling unit. The Committee is formed by the representatives of the rearers and silk khadi units. The Deputy Director (Reeling), Malda, Deputy Director,

Regional Development Office, Central Silk Board, GOI, and one official from the Khadi Village Industries Commission (KVIC) are the ex-officio members of the Committee which is headed by the District Magistrate, Malda. The Kakeme[2] is determined by the committee after every harvest on the basis of raw silk yield of the cocoons and price of the raw silk prevailing in the market. /In West Bengal, KVIC reeling ~~xxxx~~ and weaving units/ together consume about 30 per cent of the total production of cocoon and raw silk (Chakraborty, not dated). The KVIC reeling units are supposed to purchase at a price determined on the basis of Kakeme./ In fact, however, KVIC units hardly buy from producers. These show that the private traders in cocoons could be risk-neutral and still earn a high return on the gross turnover, as the 'price' is assured for them in the larger part of the market.

To note, a few studies suggest that the marketing contracts emerge under fairly common conditions of great uncertainty and information asymmetry (see, for example, Zusman, 1989). They postulate that only intermediaries obtain first hand information on buyers' offers. Consequently according to them, such contracts often feature risk-sharing and incentive provisions in addition to price-like terms of exchange (ibid). In the case of sericulture in West Bengal, however, the producers may not suffer from information-gap but their uncertainty is high due to the predominance of the private intermediaries.

There are evidence to suggest the existence of a few 'big' traders who together controls a large part of the private markets of cocoon and yarn in West Bengal. In a

situation when the buyers in the final market are having complete information on prices the possibility of price-manipulation by the traders through competition among themselves is unlikely. Those 'big' traders would instead form a market-sharing cartel. Each oligopolist having an exclusive 'zone of operation' — the quotas. The intermediaries operating under the respective principals provide the main pillars to this type of market structure. The intermediaries are instrumental in restricting the movements of the producers from market to market for higher prices. The producers have to sell out to the local intermediary. The regional level intermediaries would discourage the producers to sell directly to them by way of offering much less prices than those were offered by the local intermediaries. This battery of intermediaries, in a sense, for the respective oligopolists, provides a hedge against future 'uncertainty' (in terms of gross turnover) in case the 'collusion' ceases and the oligopolists themselves have to enter into competition with each other in order to maximize the gross turnover. This kind of an elaborate structure of the market is consistent with the relatively high frequency of 'harvest (4 to 7 'crops' a year) compared to, say, paddy. The expected annual income of each member in this market network is likely to be ensured because of the high frequency of turnover.

The oligopolist traders along with the battery of intermediaries exercise domination over an agrarian 'labour force'. They are also able to put effective resistance to the extension of the government agencies' marketing services to the producers.

The extra-economic coercion can not be ruled out in such a market structure. Although it is not truly an impersonal exchange process still it is capable of generating considerable scope for all kinds of opportunistic behaviour (cheating, shirking) as opposed to the observations made by Bardhan (1989). The oligopolist traders are very likely to undermine the quality of goods and 'force' the cultivators to sell out at below the 'normal' price.

The market thus gets 'fragmented'. The market is fragmented in the sense that the producers face different effective prices for the produced goods (while information on the prevailing prices in other 'markets' are available to the producers). This restricts private 'initiatives' as prevailing prices need not reflect true economic scarcity and, as a result, they would fail to recognize the socially profitable investment opportunity in this area of production (McKinnon, 1973: chp.2).

This structure of market thwarts the precipitation of craft specialization. Instead of selling the mulberry leaves in the 'market' the cultivators would prefer to go on to the next stage, that is rearing activity with own-leaves, and then to reeling own cocoons. This would enable them to increase the amount of value-added with own labour and, at the same time, by reducing the number of commercial transactions, decrease the proportion of economic surplus that is supposed to be appropriated by the traders by extra-economic means. There is, as well, little incentive to go

in for 'modernization' in such a system. However, the demand for money for transaction needs, at the same time, may put pressure upon the cultivators to dispense with the production instead of going in for the next stage.

The small and, to a great extent, the middle cultivators depend primarily upon the family labour while the required intensity of labour is very high in the rearing of silkworms. Given the limit to the extent of utilization of the family labour further extension of cultivation would call for hired labour. The rural 'labour market' is, however, underdeveloped in the sense that there prevails a single notion of wages and which is being fixed by custom, paternalism, or social sanctions. The differentiation in the labour market according to skills or intensity of labour-power is yet to develop. In general, the supply - demand imbalance gets reflected only in marginal seasonal variations within a given range of wages. This is usually considered as the subsistence wage although it may not be sufficient for reproduction of labour-power. The rearing of cocoons too is considered, in general, to be a variety of agricultural activity while, in practice, the type of job and the intensity that is required from a hired labour is different. As a result there happens to be an ex-ante imbalance between the demand and supply of hired labour reflecting the difference between the wage-rate that is being offered and the one at which labour would be available. Paradoxically, there is high incidence of unemployment among both rural male and female, in general, and among scheduled castes, in particular, in West Bengal (NSS, 38th and 43rd Rounds).

Bardhan (1984) observes that, with a few exceptions, the wage rate for casual labour is remarkably uniform within the village, and workers recognized by the employer as belonging to different ability types do not get paid at significantly different wage rates. Perhaps, as Bardhan argues, this is the employer's unwillingness to create invidious distinctions among his workers which may lead to problems of morale and tension among them (1984 : 71). The Bardhan - Rudra 1979 survey also found that in many villages there is open or tacit collusion of big employers in the labour market, and in some villages one big employer provides "leadership" in setting the wage rate, which the others follow (see Bardhan, 1984 : 60).

The villages or regions where the poor and small peasants are substantially engaged in sericulture the shortage of free labour to employ is significant. Secondly, the employer is keen on employing the "known" village labour rather than in hiring "outsiders" about whose work ability and particularly the dependability characteristics they do not possess enough information (Bardhan, 1984 : chp.4). /Here,we do not intend to discuss the scope of the system of labour attachment or labour - credit interlinkage (the Dadan system) 7. On the other hand, the empirical study on West Bengal by Rudra and Bardhan (1983) reveals that 95 per cent of the casual labourers are not willing to offer work for lower than the ruling wage rate to get more work (chp. 1.11.4).

Thus, it may appear that the relatively high profitability in the sector is nothing but higher returns

factor
to the relatively scarce/of production, i.e., the labour. The pure neoclassical theory of induced technological innovations suggest that the particular rate and bias of technological change would be in response to the market forces provided there are profit - maximizing entrepreneurs. The role of technology is to allow an increase in factor substitution away from the factors that have become relatively more expensive.

The technological advance in sericulture includes HYV leaves (requiring inorganic fertilisers, pesticides, and measured irrigation), and hybrid silkworms. The land and labour being two primary factors of production the capital goods can be decomposed between those that substitute for land and those that substitute for labour (Sen, 1968; Janvry, et.al., 1989). The land-saving capital is usually identified with particularly the inputs of mulberry cultivation, and which takes the form of biological, chemical, and water control investments increasing the yield per unit of land. If the land is cultivated by tractors and such other machinery and equipment it is usually identified as labour-saving capital. In the sericulture the labour - saving capital could also be identified with investments in improved silkworms for rearing apart from the other related investments such as improved rearing-house, room heater, increased number of trays, etc. The capital is labour-saving as it increases the output of cocoons (in terms of weight) per unit of labour-time spent. For instance, with marginal increase in the intensity of labour (in terms of attention)/given and the same labour-time, while about 450 kgs. of mulberry leaves produce about 13 kgs. of 'Nistari' (traditional variety) cocoons the same leaves

could produce about double amount of hybrid variety of cocoons. The technological change, however, at the same time, enhances the 'risk'. It gets reduced increasingly with the availability of 'information' regarding the appropriate conditions of adoption of the technology and the appropriate disease control mechanism.

The studies by Williamson (1985), Stiglitz (1986, 1989), Janvry et.al. (1989) show that when transaction costs[3] are taken into account optimum technology, as opposed to the pure neoclassical theory of induced innovations, becomes conditional on the distribution of assets and, consequently, there no longer exists a single optimum choice across farms. Similarly, if the public research institutions (the monopolist of scientific knowledge) do not act according to the changes in relative factor prices and instead keep on changing the general level of technology there may occur difference in the rate of technological change in land-saving and labour-saving capital. This availability of a spectrum of technologies in turn, may explain user's certain bias of the technological change between land and labour irrespective of market 'signals' (Thirtle, 1985; Janvry, 1989).

The specific conditions under which sericulture is undertaken are that (a) there is hardly any economies of scale in production (mulberry cultivation as well as rearing), (b) landownership is unequally distributed, (c) land market is underdeveloped — crop-sharing is preferred to the changes in the ownership of land, (d) the availability of institutional

credit is directly proportional to the size of the owned land. Under these conditions the response of the two sets of cultivators --- small and medium together, and the big --- to the technological change would be different.

The rate of diffusion of the advanced technology is expected to be higher in the case of big landowners whose investment decisions are ought to be influenced by the high wage rate or shortage of labour, as it is interpreted. Their easy access to institutional credit and the 'information on technology' (because of, among others, relatively high literacy rate) otherwise would have induced them to invest in labour-saving capital. Instead, the small and middle cultivators while, at least, for the sake of rationalization, would like to invest in land-saving capital their decisions would be restricted by the availability of credit, and the flow of 'information' too. If the utilization of the family - labour had reached the 'saturation' point they would also like to undertake investments in the labour-saving capital. But again the same set of restrictions would be binding.

Of course, informal credit market is there, and the availability of that is not simply related to the size of ownership of land but on various other factors (see Datta, 1990). The interest rate being much higher compared to that of the institutional credit the incentive to invest in advanced technology with borrowed capital should come from the output - market in the form of 'premium' for the 'risks' and uncertainties. Even if initial investible resources of the farmers are sufficient for such technological innovations the specific market-structure is one of the factors that may inhibit investments.

Thus, the traditional species of worm which could be fed with traditional variety of leaf would be preferred to exotic variety, The traditional charka (kat-ghai) is quite likely to be the optimum technology of reeling own limited volume of cocoons, which would otherwise have been marketed, even though the rate of 'recovery' of silk be as low as 50-60 per cent compared to that in modern filature. Following Hicks (1969) one may describe such a peasant economy as 'The Customary Economy' which is based on traditional rules and norms, and can survive in a fairly tranquil environment of no risks (or fairly calculable risks) and more or less repetitive decisions.

In traditional areas where substantial number of small cultivators are engaged in sericulture even horizontal expansion of the 'traditional technology' is restricted by the scarcity of land. The increase in output thus would depend upon the investments of the big cultivators in this economic activity. The big cultivators by dint of their collective economic, social and political power could circumvent much of the difficulties faced by others in the input, output and credit markets. More often they do not require the credit in order to undertake investments in this field. The 'information' on advanced technology is also relatively easily available to them as (a) the literacy-rate is relatively high among them, (b) they possess radio, television, etc. through which public agencies introduce the 'cultivators' to new methods, and (c) they have relatively easy access to the public research institutions by way of

undergoing training courses, etc. offered by those. Thus they, unlike the small cultivators, do not have to depend upon the extension services of the government agencies at the village level. In addition, there is the labour-saving technology available to make the investments profitable for them.

Given the 'pressure' on land, and the set of imperfect markets the choice would be exercised, by big landowners, in between self-cultivation and tenancy-cultivation which may not necessarily be guided by economic rationality. Of course, the transaction costs in the form of supervising hired labour, in sericulture, would be high. At the same time, sericulture gives the highest return on investments in agriculture. Bardhan (1984) observes: 'If there were a complete set of perfect market, tenancy would have been theoretically uninteresting or insignificant' (p.95).

It is found that in the traditional areas where the demand for land is high and coming mostly from the small cultivators the big landowners who are in sericulture for a pretty long time are now entering into sharecropping tenancy-cultivation. This is symptomatic of the fact that share-cropping is preferred to by the landowners. In new areas, on the other hand, the demand for land for mulberry is low and hence the tenancy-cultivation may not be as profitable as it is in the traditional areas. Even then there is hardly any big farming. Perhaps this may be partly expalined by the relatively high production uncertainty.

In general, however, both in the traditional and new areas, it is evident that the big landowners are risk-averse. In turn, the availability of land, even on crop-sharing contract, for mulberry cultivation would be difficult. Because the nature of 'contract' would certainly differ from those exist in traditional crops to which the 'traditional' big landowners are comfortable. In other words, this may be explained in terms of differential monitoring costs (see Datta and Nugent, 1981).

The way in which a farmer organizes production, given alternative investment opportunities in agriculture in order to maximize the rate of return is an important indicator by which the farmer could be characterized as either a capitalist or 'traditional'. The relative prices of the agricultural crops, food as well as commercial, the agro-climatic conditions, and other technological factors together determines the 'rational' choice of the composition of crops to be cultivated. However, the underdeveloped markets may act as the counter-vailing factors.

In a broader framework of reference, the phenomenon of 'shift' to the cultivation of HYV paddy and wheat by the rich farmers, during the late '60s and early '70s motivated scholars to enter into the debate on the 'mode of production' in Indian agriculture (most of the articles appeared in various issues of the Economic and Political Weekly during 1970s). On the basis of data on various related factors, such as, concentration of land, investments in implements, etc. many of the studies suggest that capitalism today dominates Indian

agriculture (e.g. Patnaik, 1971, 1972, 1976; Rudra, 1974, 1978; Harriss, 1979; Thorner, 1982). Following them it seems a capitalist 'class' has taken shape in Indian agriculture. However, a 'class' as is being located in relation to the rest of the society could be identified, in the same vein, by its class-consciousness the contours of which develop out of the particular ways the individuals, as a group, operate in the politico-economic arenas. Specifically, the 'rational' economic behaviour of the capitalist farmer, of course, is assumed to be that the farmer respond to the market signals so as to maximize the gross return. Accordingly, the paradox of high relative profitability and the marginal presence of the rich farmers, in West Bengal, in the commercial cultivation of mulberry remains unexplained by the hypothesis. The weakness of the hypothesis, it seems, is located in the fact that it has given marginal attention to the role of the state in providing irrigation facilities, fertilisers and implements at subsidized prices, liberal bank credits, and, finally, a market with guaranted prices for the outputs —— the system of government procurement — and, the subsequent role of the rich farmers, in a practically 'zero risk' situation.

What nature made distinct, the market makes homogeneous. When the 'logic' of the capitalist market is inoperative, as Polanyi (1957) suggests, the substantive meaning of "economic" usurp the formal meaning. The latter derives from logic, the former from fact. 'The formal meaning implies a set of rules referring to choice between the

alternative uses of insufficient means. The substantive meaning implies neither choice nor insufficiency of means; man's livelihood may or may not involve the necessity of choice and, if choice there be, it need not be induced by the limiting effect of a "scarcity" of the means' (Polanyi, 1957 : 243-4). There is, for instance, scientific method of getting rid of the outbreak of the 'muscardine' disease, and which is not unknown to the cultivators. Yet in many cases it is found that the cultivators act according to their 'beliefs'. The 'modern' method would suggest cleanliness, maintaining proper humidity and ventilation, etc., inside the rearing room along with burning the dead worms and using Formalin chaff/Diathene. Instead, the cultivators keep their domestic animals like cow, goats locked inside the rearing room continuously for 3-4 days on the belief that those animals would 'consume' the disease.

Finally, what explains the predominance of Muslims and the so-called "backward" Hindu-castes such as Mahisya, Chai-Mondal, Paundra-Khatriya in small-scale 'rearing' and kat-ghai reeling activities ? Perhaps, the prepondarance of the close correspondance between the hierarchy of caste and economic activity, the status of the job in the society, and the status of the women and children, who perform crucial role in sericulture, in the families of the respective communities together could explain the phenomenon. The social division of labour is yet to take shape on the basis of economic calculations. Historically, after the rapid decline of the silk industry in Bengal, during the late nineteenth

and early twentieth centuries, the survival of the silk production, till the recent development took place, could be traced in those communities only, in a few districts.

II. The Data[4]

The silkworm rearing is done, in West Bengal, in the following six seasons : April (Baishakhi), May (Jaistha), June (Shrabani), August (Bhaduri), November-December (Agrahayani), and February-March (Falgooni). Depending on the availability of the mulberry leaves five to six cocoon crops could be harvested at intervals of 2 to 2½ months. However, there is a difference of 8 to 24 days, in the seasons, in between different districts. This is partly explained by the timings of sowing and harvesting of foodcrops, and harvesting of mojor commercial crops like mango.

There are a few characteristics of the techno-economics of sericulture which distinguish it from other activities. First, the soils for mulberry cultivation should be deep, well-drained, clayey loam to loam in texture, friable, porous and with good moisture holding capacity. Slightly acidic soils which are free from injurious salts are ideal for good growth of mulberry plants. Even the saline and alkaline soils could be improved for cultivation by the application of gypsum or sulphur or by green manuring (Ullal and Narasimhanna, 1987 : 10). Obviously, the land-improvement costs are there but compared to the profitability of the sector those costs appear to be marginal. Moreover,

it shows that the land-scarcity as an argument for the slow growth of the sector is partial. The technological progress in mulberry plants has rendered the cultivation possible in a variety of lands (Source : Central Sericulture Research & Training Institute, CSB, Baharampur). While irrigation is an important input in raising the leaf yields an additional advantage in West Bengal is that adequate annual rainfall and the water retention capacity of the alluvial soil together does not call for an elaborate system of irrigation in many regions of the state.

Secondly, there is an optimum ratio of the fixed to working capital, the adherence to which minimizes the risk and uncertainty, and maximizes the returns to the farmer. To elaborate, the fixed capital components are : land under mulberry, rearing house, laying and spinning trays, and some other instruments such as, room-heater, hygrometer, etc. These together determines the volume of working capital to be employed, i.e. the amount of silkworm eggs (in short 'seed') to be reared. For instance, improved variety mulberry leaf production (about 32 quintals per season) on a land of about 0.66 acre could feed about 400 hybrid variety (F_1/Jaya) disease free layings (dfls.) /~implying eggs laid by 400 months~7 (see Table 2). Then, to rear 400 dfls., at least 52 rearing trays and 25 spinning trays are required. To place those trays in an arranged order, 4 racks are needed. And a room of the size 22ft. x 10ft. x 10ft. is required to accommodate those 4 racks, in addition to the free space needed on the floor for 2 trays at a time. If the technologically determined proportions were violated and instead

the trays are over-crowded with more number of seeds, there would be negative economies in the sense that the growth of the larvae would be restricted because of inadequate feeding and, at the same time, diseases would make the larva mortality-rate higher.

Thirdly, the initial capital requirement, for good quality cocoon rearing, is high. For instance, the cultivation of mulberry on a land of one acre, in absence of the direct market for the leaves, would call for such types of assets (as discussed above) the market value of which, in aggregate, may well be in the range of Rs. 14-17,000/-, including a mud-built rearing house(for details see Note 4 of Table 1). However, to start with, most of the cultivators use the dwelling rooms for the purpose. In such case, a sum of about Rs. 4000/- would be needed as initial capital to buy the equipments (for rearing about 400 dfls, in each season). It could be reduced further by hiring the required equipments. In addition, there is the cost of cultivation of mulberry itself (see Appendix I) along with the requirement of working capital to buy the 'seeds'.

Fourthly, the family labour, especially the labour of the women in the family plays a crucial role. Silkworm rearing calls for intensive attention as well as mother's care, especially, during the later stage of the larva. Identifying and then collecting mature silkworms and putting on the spinning trays require a great deal of skilled and intensive labour. Moreover, there is hardly any time-specific routine. The work goes on round-the-clock, with intervals.

These beget problem of getting hired-labour at the wage-rate that prevails in other agricultural activities. However, the availability of 'free-time' from the members of the family is constrained by the extent of engagement of the household in the cultivation of other crops and the related works such as, rice-boiling, drying, etc. Notwithstanding, the small and medium farmers primarily depend on the family labour including children as, apparently, there is no 'cost' involved in engaging them excepting for those households who consider the education of child as a better alternative.

Fifthly, the 'information/knowledge' of technology is instrumental in making the cultivation a profitable venture. This includes the nature of feeding, temperature and humidity to be maintained inside the rearing room, identification of the stages of growth of the larva by size, shape and colour, and the diseased worms, the knowledge of proper pest control, etc. In the 'traditional' areas of cultivation the traditional variety of worm, that is Nistari, does not create much problems to the cultivators as the 'knowledge' is transmitted to them through generations. By contrast, the cultivation of hybrid 'crops' necessarily depends upon the flow of 'information' from the government agencies who monopolize the technical know-how. The cost of 'learning by doing' is very high in this case. However, once the 'information' percolates down to the cultivators it may propagate horizontally, through the cultivators themselves, sometimes through skilled rearers who out-migrate due to economic reasons, or migration of women from the sericulture areas as a result of marriage, etc.

Yet updating of the knowledge by field-level demonstration is an essential part of increasing the productivity and decreasing the risks of the cultivators.

Sixthly, the sericulture output to a great extent depends upon the availability of disease free layings. There are various sources of 'seeds', and unless the quality is strictly controlled, so far as the reproduction of the moths is concerned, the entire 'forward' linkages would be affected. However, the 'quality' could not be guaged simply by the appearance of the 'seeds' in the 'market-place'. The availability of disease free layings is ensured only by a scientific method of rearing of seed-cocoon and getting those seeds tested by microscope.

So far as the availability of land for the cultivation of mulberry is concerned the constraints are more institutional, in nature, than factors like 'opportunity cost' of land. The rich soil of the state makes the per unit yield of mulberry to be the highest in India — about 240 quintals per hectare (GoWB, not dated), and that too under rainfed condition. In spite of that, unlike, say, Karnataka, the cultivation is concentrated merely in a few locations. Out of a total of 36,000 acres of land under mulberry, in 1988, the district of Malda alone constituted about 48-50 per cent. The bulk of the rest are shared by Murshidabad (5,259 acres), and Birbhum (4,440 acres) (GoWB). The average mulberry land per cultivating household is also very low — about 0.45 acre with marginal variation over the districts /Source : Dept. of Sericulture,

GoWB (unpublished district-wise data) /. This shows the predominance of small cultivators in this sphere of activities.

The major cash crops replaced, in the new areas, are jute in Malda, Murshidabad, West Dinajpur (about 2,700 acres under mulberry), and sugar cane in Birbhum /Source : Dept. of Sericulture, ibid /. According to an estimate (GoWB, not dated), net income from the mulberry cultivation together with silkworm rearing per bigha of land was Rs.5,996, in 1984, while that from sugar cane was Rs.1500, mustard seed Rs.935, 'Aman' paddy Rs.910, Jute Rs.844, 'Boro' paddy Rs.689, and from wheat Rs.379, in West Bengal, which includes the costs of family labour.

The space of sericulture in the state could be classified into high-concentration and low-concentration areas. The high-concentration areas are usually the traditionally cultivated areas where cultivation is on for last 50 years, or even more. In the latter areas the 'price' of land suitable for mulberry has gone up to twice that of the usual paddy-land (about Rs.24-25,000 per 'bigha' or 0.34 acre). The small cultivators who are willing to expand the activity are thus forced to migrate to other places. This migration has been a signifacant factor in the development of sericulture in new areas.

The traditionalityhas rendered some places with the concentration of mulberry lands. A few farmers having 4-6 acres of land under mulberry, and selling leaves to rearers,

in those areas (for instance, Bhadrapur in Birbhum, Sujapur and Kaliachak in Malda) are evident. Moreover, the high demand for land, coming mostly from small cultivators, in those areas has been instrumental, to some extent, in transforming the system of self-cultivation by the big farmers to cultivation by share-tenants. There are various forms to tenancy cultivation. Of which, sharing the mulberry crops only (fixed rent or actual crop-yield basis) without sharing the cost of cultivation is quite frequent. In that case the monitoring costs of the landlord is minimum. There is also the type of contract by which the landlord does not share the costs of mulberry cultivation and the harvest is not distributed. After harvest, the landlord gives 'seeds' and, sometimes, the equipment, e.g. the laying and spinning trays which amounts to a form of production credit to the cultivator-rearer, and ultimately shares 75 per cent of the cocoon-yield. Although this interlocking of the land-lease contract and the credit contract may enhance the monitoring costs of the landlord but yet that might be less than the costs of monitoring the hired labour. Socondly, the landlord thus could avoid hiring labour at higher wages. In contrast, in new areas generally the big landowners who ~~use to~~ cultivate the traditional crop-mix by the share-croppers are aversed to mulberry cultivation. Since best of the lands are mostly owned by them this has affected the growth of the activity. The possibility can not be ruled out that the small cultivators too in the new areas are not willing to pay 3/4th of the crop as part of the tenancy contract after bearing the risks and uncertainty on their own which, among others, also appear due to the marketability

conditions. Thus, the terms which are acceptable to 'traditional' cultivators may not be so to 'new' cultivators. The rearers in the traditional areas have developed 'expectations' out of the observed 'cycle' of failure and success over a long period of time. That would, of course, be different from the calculation of costs of uncertainty by a cultivator in new area.

Thus, while expansion over space is theoretically possible in the new areas the expansion in the hi-concentration areas would largely depend upon the scope of modernization. It is found that the comparatively low yielding Nistari variety of silk-worms are widely cultivated in the traditional areas. The rationale could be that these worms not only consume relatively less amount of leaf but as well could survive on the traditional variety of mulberry leaf. Moreover, 'traditional knowledge' is more or less adequate to rearing 'Nistari' worms, and no additional risk is involved. In addition, the persistence of the fragmented market-type institution, as discussed in Section I, has generated a strong repulsion to the immediate sell of the cocoons wherever possible to the intermediaries. Instead, the cultivators prefer to go in for silk-yarn production. The traditional charka or kat-ghai which could be installed with their limited resources turns out to be relatively profitable to processing those Nistari cocoons. It is rather uneconomic to reeling those cocoons in modern filature as there are frequent discontinuities in the long stretch (about 250 metres) of yarn. On the other hand, if hybrid cocoons

are reeled in kat-ghais the rate of recovery of silk from those cocoons would be about 60-70 per cent of that in the filature entailing a loss in gross return as hybrid worms consume much more leaves, almost double, compared to Nistari (see Table 2).

The small holdings of lands which could produce adequate leaves for the existing numbers of 'Nistari' silk-worms reared would no longer remain economic for the same number of 'hybrid' rearing. While about 450 kg. of mulberry leaf is required to rear 100 dfls. of pure 'Nistari' the requirement for the same number of hybrid bivoltine is about 750 kg., and for pure bivoltine about 900 kg.

Moreover, the hybrid silkworms are by nature quite delicate and are highly sensitive to environmental conditions. The atmospheric temperature and humidity prevailing inside the room at the time of rearing, and the specific methods of rearing adopted, such as feeding, cleaning, spacing, etc., have important bearing upon the productivity. The high productivity of good quality cocoons of very high silk content is ensured only when those factors are properly taken care of. On the other hand, this particular cultivation would also entail a relatively higher investments in 'means' such as, laying and spinning trays, disinfectants, proper room-space, etc. Most of the cultivators use their dwelling rooms which are not properly 'hygenic' for such rearing. The construction of a 'model' rearing house (with mud-walls) may cost anything between Rs.10-15,000. Moreover, the 'shift' to hybrid rearing would automatically make the cultivators

dependent upon agencies who monopolize the knowledge of perfect rearing of hybrid cocoons, which again changes at intervals of time. Any untidy attempt on the part of those agencies to propagate the 'knowledge' would disturb the balance and lead to a disaster for the cultivators. There are evidence to show that cultivators once introduced to the hybrid 'crop' by the government agencies, and because, due to lack of manpower or other reasons, those agencies later failed to attend the cultivators periodically, they subsequently gave up the cultivation after incurring huge losses. The illiteracy is partly responsible in the sense that the cultivators could not follow the printed literature.

In the low-concentration areas (mostly new areas) although there is a greater degree of availability of land for mulberry the big cultivators' response is found to be lackadaisical. The government agencies have played a crucial role in extending the cultivation to new areas. But at the same time the whole efforts of those agencies are concentrated in introducing the cultivation of hybrid 'seeds' alongwith hi-yielding varieties of mulberry plants which require higher doses of fertilisers, etc. The technologically determined high ratio of fixed to working capital, moreover, calls for relatively high initial investments. Naturally, that acts potentially as a hedge against the marginal farmers who have limited resources to invest in. Yet it is true that, the cultivators who own at the most 2 bighas of cultivable lands and those, if suitable for mulberry, could be utilized most profitably

in sericulture. This is how the private money lenders' role gets strengthened, where extension efforts of the government agencies are not followed by adequate institutional loans.

The upward mobility of the marginal cultivators is however, restricted by the capital-bias of the 'new' technology of production, and subsequently the limited availability of ~~the~~ land and the institutional loans. For instance, any further expansion of the present volume of 'seeds' (say, 300-350 dfls. 'F_1') which could be fed with the improved variety (say, S_1) of leaves produced on the existing size of the land (say, 0.66 acre) and reared in the existing rearing room (of size, say, 22ft. x 10ft. x 10 ft.) would be economic only when the land-size as well as the room-size are increased. However, the concept of 'marginal' change in this respect is hardly applicable.

The existing system of 'price discrimination' also acts as disincentive to technological innovation. For instance, in a particular season, while the private traders paid Rs.40-45 for a kilogram of Nistari green cocoons and Rs. 50-55 for 'F_1' race (Nistari X Bi) cocoons the government agencies bought the same at Rs.60-65, and Rs.75-80, respectively. The 'government' prices for the dry cocoons were still higher — for 'Nistari' Rs.100, and both for F_1 and 'Jaya (Pure Mysore X Bi) Rs.125-130. The private traders, in general, do not adequately compensate for dry cocoons. Unlike traditional areas the new areas are yet to adopt the kat-ghai reeling.

And, since cocoons are perishable commodity which could be hoarded for not more than 60 days the cultivators have to sell their stocks at whatever prices they are offerred. Moreover, the traders' practise of discounting a certain percentage of the actual weight of the produce too is an accepted fact. The assessment of raw silk yield from the cocoon lots, by the traders, is also arbitrary. The situation is marginally better in the traditional areas since the growth of the local reeling units (mostly traditional and the total cost of installation of which does not exceed Rs.1,000) provide an alternative vent for the produce. However, the general practise of those reelers is to buy the cocoons from the cultivators, in excess of the quantity of own cocoons, on credit. And the payments are subject to the realization of the money from selling out of the yarns.

The oligopolistic control of the traders, however, surfaces more prominently in the yarn market. The small producers who could not carry their yarn output to markets. say, in Bangalore,or Benaras for selling at higher prices have to sell to the immediate buyers -- agents of the big traders. There are evidence that the big traders refused to pay as much pricesas their agents were willing to pay, whenever the producers attempted to take their output directly to them. The differences between the prices offerred by the local intermediaries and the oligopolist traders are sometimes to the tune of Rs.60 per kg. of yarn. More the spatial distance of the 'bigger market' from the location of production more is the margin between the two

sets of prices.

Both the Central Silk Board (CSB) and the sericulture department of the Government of West Bengal buy cocoons from the cultivators through their respective regional offices. But while CSB takes at the most a day for the payments to the sellers the state's sericulture department takes, in general, more than three months and in some cases even more than six months to pay for the cocoons. Tentatively, those two government agencies together buy about 10 to 15 per cent of the cocoons produced in the state. The delay in payments together with the limited resources to buy more of the cocoons produced has made the State-run modern filature unit at Madhughat (in Malda) a loosing concern, and another filature at Berhampore (in Murshidabad) a non-starter. The volume of cocoons that the government agencies could procure hardly satisfies 20-25 per cent of the requirement to 'run' the filature unit at Madhughat at its installed capacity.

The limited resources of the state's sericulture department has restrained further the required expansion of the departmental activities at the grass-root level in the form of employing more field-demonstrators and related man-power. At present a field officer, in general, is used to 'cover' about 3 blocks of villages. All these come in the way of effective dissemination of the knowledge of sericulture. The promotional policies, de facto, have reduced to paying departmental subsidies and helping, in a limited way, a small number of cultivators to acquire

institutional loans. All these together would show why despite their active presence the government agencies could not thwart the forces of stagnation.

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Notes

1. The country charkha/kat-ghai is a simple appliance (costs about Rs.200/-)which is manually operated by two persons, viz. a reeler and a turner. There are inbuilt inadequacies in this appliance which severely restrict the scope for reeling quality silk. The cottage basin is an improvement over the charkha. Five to ten basins can be conveniently operated by fractional motors so that the 'yield' per unit of time is much higher than that of the country charkha. The cost of a basin is about Rs.1000/- without re-reeling attachment (Ullal and Narasimhanna, 1987: 163). Moreover, the cottage basin is capable of producing higher quality silk. The filature on the other hand is a large factory where the high quality of reeled silk is ensured by the use of advanced process - technology. There is also a scale-economy associated with the filature.

2. Kakeme : First, the rate of discount due to the weight of the dead pupae is determined (say, 52%). Secondly, the percentage of silk recovery from dry cocoon is fixed (say, 35% of net weight). Thirdly, the increase/decrease in the cost of production of cocoon is taken into account.

3. Transaction costs refer to the cost of information and of negotiating, monitoring, supervising, coordinating, and enforcing contracts (Janvry, 1989).

4. Wherever the source of the information is not mentioned it is to be presumed that the data were generated out of the pilot survey that I undertook in the districts of Malda, Murshidabad, and Birbhum in West Bengal in November, 1989.

Table 1

Net income from rearing 400 dfls. of (Ni X Bi) 'F_1' hybrid silkworm eggs per season in 1989-90 (approx.)

A. Costs	Rs.
1. Cost of silkworm eggs : 400 dfls. @ Rs.80/- per 100 dfls.[1]	320/-
2. Labour cost :	
a) 1st and 3rd age - 12days, 3 labours per day[2]	648/-
b) 4th and 5th age - 12 day, 4 labours per day	864/-
c) Spinning stage - 2 days, 5 labours per day	180/-
3. Cost of 3,000 kg. of leaf @ Rs.0.56 per kg.[3] /@ 750 kg. of leaf per 100 dfls./	1,680/-
4. Formalin, Paraffin paper, etc.	100/-
5. Transportation charges	50/-
6. Depreciation of fixed assets[4] @ 10% per annum[5]	400/-
TOTAL : (say)	4,250/-

B. Gross sales	
200 kg. of cocoon @ Rs.55/- per kg.[6] /Cocoon production : 100 dfls. = 50 kg./	11,000/-
C. Net income (say)	6,750/-

..... Contd.

..... Contd.

Source : The requirement of labour-time is as calculated in Ullal and Narasimhanan (1987 : 136).

Notes : 1) Rs.100/- per 100 dfls. of PM X Bi - the government agencies' rate.

2) Wage rate is assumed to be Rs.18/- per day.

3) See Appendix I.

4) The schedule of the fixed assets is, as follows :

	Rs.
(a) Rearing house of size 22'x10'x10' -	10-12,000/-
(b) Rearing bamboo trays - 52 nos. @ Rs.35/- each	1,820/-
(c) Spinning bamboo trays - 25 nos. @ Rs.55/- each	1,375/-
(d) Hygrometer and other instruments	500/-
(e) Bamboo rearing stand (rack) - 4 nos.	1,000/-
(f) Miscellaneous (like nets, etc.)	500/-
Total :	15-17,000/-

5) Assuming 4 crops a year; per annum depreciation, on an average, being Rs.1600/- (cf. Note 4).

6) This is the price at which the private traders, on an average, buy 'F_1', cocoons compared to Rs.75-80/- that the government agencies (like Madhughat Filature Unit) pay for those. The local reelers, however, pay about Rs.60.

Table 2.

Quantity of silkworm eggs (variety-wise) that could be reared economically in the 4 different seasons with improved (S_1) variety of leaves grown on about 0.66 acre of land

Season	Leaf yield (kg.)	Quantity of eggs		
		Ni	F_1	Bi
April-May	3,200	700	425	355
Aug.-Sept.	2,500	550	325	275
Nov.-Dec.	3,200	650	375-400	300-325
Feb.-March	3,200	650	375-400	300-325
Total	12,100	2550	1500-1550	1230-1280

Notes : (1) During Aug.-September the leaf yield declines.

(2) During Feb.-March and, especially, Nov.-December the life-cycle of the silkworm becomes longer resulting in increased requirement of leaves.

(3) Normally, 100 dfls. of Ni (Nistari) consume about 450 kg., F_1 hybrid 750 kg., and pure bivoltine (Bi) 900 kg. of mulberry leaves.

Appendix I

Cost of cultivation of one hectare of mulberry under irrigated conditions per annum in West Bengal

1st year of cultivation[1] :	Rs.
1. Preparation of land :	
Digging, levelling and manuring ----	
150 man-days[2]	2,700/-
Ploughing — 22 pairs of bullocks	
@ Rs.25/- per day	550/-
2. Cost of mulberry cuttings-60 maunds	
@ Rs.10/- per md.	600/-
Preparation of cuttings - 20 man-day	360/-
3. Planting - 75 man-days	1,350/-
4. Manures and fertilizers :	
a) Farmyard manure 10 tonnes @ Rs.100/- per ton	1,000/-
b) Fertilizer - 100 kg. N : 80 kg. P: 80 kg.K	2,500/-
5. Irrigation	500/-
Total :	9,560/-

..... Contd.

..... Contd.

2nd year of cultivation :	Rs.
1. Pruning 4 times — 168 man-days	3,024/-
2. Light digging 4 times - 336 man-days	6,048/-
3. Weeding 4 times - 336 man-days	6,048/-
4. Heavy digging once (January-February) - 105 man-days	1,890/-
5. Manures and fertilizers :	
a) Farmyard manure - 22 tonnes @ Rs.100/- per ton	2,200/-
b) Fertilizer - 336 kg. N: 80 kg. P:80 kg. K	3,500/-
6. Irrigation (4 times a year)	2,000/-
Total :	24,710/-

Leaf yield : 44,500 kg. per hectare per annum[3]

Production cost of 1 kg. of leaf = 56 paise

Source : The method of estimation of costs has been taken from S.R. Ullal and M.N. Narasimhanna, Handbook of Practical Sericulture, Central Silk Board, 1987, pp. 40-43.

Notes : (1) In the year of planting, expenditure has to be incurred for preparation of land, building, planting, etc. This cost has to be divided over a period of 10 years as mulberry is a perennial crop and lasts easily for 10 years. Mulberry comes to bearing after about 6 months of planting. However, the output of mulberry leaf in the first year of planting is rather low (Ullal and Narasimhanna, 1987).

..... Contd.

..... Contd.

(2) Man-day are valued at Rs.18/- per day, according to the minimum wages declared by the Government of West Bengal.

(3) In West Bengal, the R & D of the Central Silk Board suggests only 4 harvests due to seasonal conditions favouring silkworm rearing -- in May-June (Jaistha), August - September (Bhaduri), October - November (Agrahayani), and January-February (Chaitra).

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