***Original Research Article***

# Influence of socio-personal and management factors to generate the knowledge level of the farmers associated with sericulture of West Bengal, India.


## ABSTRACT

Knowledge level is assessed in respect to a total of twenty-one socio-management variables associated with sericultural practices by the farmers in West Bengal, India. The study was conducted using a total of 126 respondents under three districts. The independent fourteen societal and seven management factors were statistically analyzed using correlation, path, factor and regression models. Consistency and dependency level in between the independent variables were assessed and found discrete and/or random in nature. Various model values by path analysis showed the direct substantial effect on $x_{10}$, $x_{12}$ and $x_{19}$ where they occupied the $1^{st}$, $2^{nd}$ and $3^{rd}$ positions respectively. Variables were sorted by factor analysis for an intrinsic conglomeration to form a homophyllus group and seven factors were identified with their variation and cumulative percentages. Regression equations was extracted for knowledge level (y) separately as dependent variable and MDS (Minimum Data Set) as predictor set. The probability of '*F*' value ranged from 0.05 - 0.10 and found variables $x_{10}$ and $x_{16}$ were critically effected on the predicted character knowledge level (y). Considering all these socio-management factors, if the identified variables can be taken care in knowledge level increment, the number of sericulture farmers will be more in future across West Bengal.



*Keywords: factor analysis, farmer's knowledge level, path analysis, regression analysis, sericulture, socio-management factor.*



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## 1. INTRODUCTION

Agriculture stands in the second largest position in the world as a source of work force (MESHA/2010/10) compared to the other economy generating sectors. In other respects, agriculture is one of the riskiest occupations among all income generating sectors in the world as many agricultural workers suffer from various work accidents and diseases every year (MESHA/2010/10). Lack of education, knowledge, and unintentional application and practice errors like; handling of pesticides, herbicides carelessly can pose serious health risks of the agricultural farmers [5]. Concerns about the adverse effects of such chemicals on health are increasing among the farmers' community in the developing countries, due to the low educational level and unfavorable working conditions during cultivation practices [12]. However, agriculture is extremely important to the Indian economy which supports more than 70% of rural families. It is a significant part of the Indian economy, accounting for over 17% of total GDP and employing more than 60% of the population [2].

Sericulture is an agro-based cottage industry, provides exclusive opportunity for socio-economic progress of the rural communities under developing countries. Sericulture and silk yarn processing are exceptionally a remunerative employment-oriented industry, highly suited for Indian rural farmers [3,11]. At present more than 58 countries worldwide are involved in sericulture, and India achieved the second position in global silk market. It is estimated that 7.5 million farmers across 59 thousand villages in India are actively engaged in sericulture and its allied activities [14,18]. A diverse farming system by replacing the old prototype agriculture is the only option of agro based production necessary to sustain all kinds of micro, meso and mega life forms. Sericulture has taken a vital place of such new varied farming system where it starts from plantation and ends at textile industry. As a result of the construction of rural-based industries such as sericulture, many new jobs were created in different domain as well and it plays a significant role in reducing rural emigration to cities [9,7].

The unorganized sector in India employs over 90% of the labour force and does not provide social security or other job benefits like the organized sector does [22]. As a result, sericulture has the ability to provide rural communities with a year-round source of income and sustenance [6]. Due to its considerable employment potential, sericulture contributes to the rural economy's dynamism and vitality. Sericulture operations *i.e.,* on-farm and off-farm activities were assessed in India in 2008 by Gangopadhyay and categorized the mode of employment into direct and indirect means. The direct employment includes feed plant cultivation, leaf harvest and silkworm rearing while indirect employment falls under reeling, twisting, weaving, printing, dying and silk

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waste processing. In addition to providing high revenue return and a better living standard of the entire family, sericulture provided full-time employment for the unemployed household.

Adoption of new technology is necessary for the improvement of any industry, and the technology development should be profitable and acceptable to the end user as well. To achieve specific goals such as increased crop output and productivity, as well as increased employment and revenue for farmers, sericulture technology is being introduced in the developing countries. This will not only increase silk output, but it will also improve the quality of life, standard of living and socio-economic situations of the rural population [19]. Several factors that influence the perspective of tribal communities' livelihoods in India, including geographic location, community type, age, gender and education, swings in resources as well as improvement of extension services which plays a significant role in societal and management knowledge level [15,1]. In this study, we have highlighted the socio-personal characteristics of the sericulture farmers as causal variables to assess the knowledge level at domestic level. Therefore, before going for an attempt to upgrade the sericulture up to the level, an in-depth study about the existing socio economic and management problems of sericulture farmers, is of prime important issues. The present study envisages to assess the socio-economic and management constraints facing by the sericulture farmers at grass root level in relation to generate higher income in sericulture enterprise.

## 2. MATERIALS AND METHODS

### 2.1 Locale of research

The study was conducted in the following districts of West Bengal *viz.,* Murshidabad, Nadia, and South 24 Pargana (Fig.1) where the sericultural practices are still continuing with minimal economy return. Sericulture had occupied a steady position for a long time in these districts and farmers were highly responsive which helped us to judge their knowledge level and to carry out the extension programs intensively.

### 2.2 Pilot study and sampling

Pilot study was conducted with deep attention and precise observation including distribution of the district's agro-climatic condition, mulberry varieties under cultivation, silkworm breed under rearing along with pest and disease management strategies adopted by the farmers. The one to one interaction with the respondents had been arranged at village level under district's block (Fig.2). The purposive studies were conducted at block level of the said three districts. Block Nabagram and Khargram were considered in Murshidabad district,

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Karimpur-II and Kulpi were taken under this study of district Nadia and South 24 Pargana, respectively. Socio-personal and management variable data were collected from a total of 126 respondents under the three districts. The dependent and independent variable factors used in this study are summerized in table1.

### 2.3 Statistical data analysis

The important statistical measures like; mean, median, mode, standard deviation (SD), coefficient of variation (CV), coefficient of correlation regression analysis were conducted using SPSS software to understand and identify the degree of relationship between variable(s) associated with farmer's knowledge level. Survey based empirical field data were critically extracted using path and factor analysis to identify the casual models between dependent and independent variables and to reduce the number of independent variables into factors, respectively.

## 3. RESULTS AND DISCUSSION

### 3.1 Empirical analysis

The empirical analysis of knowledge level as dependent variable was compared with a total of twenty-one independent socio-personal and management variables. The statistical tools used and results of all variables are summarized in table2. The statistical descriptive data of all independent variables showed wide range of consistency by individual means. Variables $x_1$, $x_2$, $x_4$, $x_5$, $x_7$, and $x_{10}$ were found fairly consistent in nature. Again, variables $x_{14}$, $x_{16}$, and $x_{17}$ were found moderately consistent in nature. Variables $x_8$, $x_{12}$, $x_{13}$, and $x_{15}$ showed consistency similar to the dependent variable y. Highest consistency was found in $x_6$, $x_{18}$, $x_{19}$, and $x_{20}$. Again, variables $x_3$, and $x_9$ showed fairly inconsistency in nature while variable $x_{21}$ was found completely inconsistent. Interestingly, it was found that variable $x_{11}$ is not consistent in nature towards increment of y. Results showed management factors were comparatively highly consistent than socio-personal factors. The only dependent variable knowledge level (y) scored the mean, median, mode as 30.51, 31.00 and 31.00 respectively. The standard deviation and correlation of variance values are 1.568 and 5.139 respectively with minimum and maximum of 20.00 and 34.00 respectively. It indicated that the variable is consistent in nature that are mostly similar to the socio-personal factors.

### 3.2 Correlation coefficient between dependent and independent variables

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The correlation coefficient (r) of farmer's knowledge level (y) with all independent variables ($x_1$-$x_{21}$) were identified. Individually, the independent socio-personal variables ($x_1$-$x_{14}$) and management variables ($x_{15}$-$x_{21}$) were analyzed with dependent variable (y) using correlation coefficient (Fig.3). Amongst fourteen independent socio-personal variables eight were found positively correlated *i.e.,* $x_1$, $x_3$, $x_4$, $x_8$, $x_9$, $x_{10}$, $x_{11}$ and $x_{14}$ whereas remaining six *i.e.,* $x_2$, $x_5$, $x_6$, $x_7$, $x_{12}$ and $x_{13}$ were found negatively correlated with respect to dependent variable y. Variable $x_{10}$ showed highest positive value (0.424) and whereas $x_6$ showed the highest negative value (-0.18) with y. It means knowledge level directly depends on the utilization of information source while the land holding capacity value does opposite of it. Again, amongst seven independent management variables only one *i.e.,* only $x_{19}$ was found positively correlated whereas remaining six *i.e.,* $x_{15}$, $x_{16}$, $x_{17}$, $x_{18}$, $x_{20}$ and $x_{21}$ were found negatively correlated with dependent variable y. Variable $x_{19}$ showed positive value of 0.365 whereas $x_{18}$ showed highest negative value (-0.186). It means knowledge level directly depends on number of employment days per year while cocoon production has distant relationship.

### 3.3 Analysis of socio-personal variables with knowledge level

In sericulture, farmers get experience with more the time spent and thus more the age ($x_1$), more the knowledge they gather about sericulture. It has been found that in compare to younger farmers, the aged have more experienced knowledge about the different aspects of sericulture viz., plantation and management of mulberry plants (seed preparation, planting methods, fertilizer and other management, harvesting and storing of leaves etc.) as well as rearing and management of silkworm (rearing house management, life cycle knowledge of silkworm, feeding, disease management). Variable education ($x_3$) has a great role on the knowledge level of farmers. An educated farmer is more capable of understanding the latest technologies through different mode of information dissemination and it can efficiently increase the knowledge level to get optimum economy return. Any kind of social participation ($x_8$) generally has gone positive, productive and predictive for augmenting knowledge upgradation, motivating adoption behavior and income creativity. It has also been found here in this study. When farmers have more interaction with organization like panchayat, panchayat samiti, cooperative, farmars' club etc. they can get more chance to gather more updated information about sericulture field and thus their knowledge level increased. Organization like NGOs, rural youth club, village based community etc. help in updating farmers' knowledge also. Again, training ($x_9$) is regarded as an age long concept which performs the therapeutic function of shaping the knowledge, skill and attitude that are required for effective performance of any production system. The training of people engaged

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sericulture aim at communicating information, knowledge and skills about the sericulture and replacing old practices by new ones, exchanging opinion and experiences, removing doubts and difficulties those are related to sericulture. Therefore, in the present study it has also been found that if proper training can be given to the sericulture farmers, it will have positive significant impact on knowledge level of farmers. Utilization of information source ($x_{10}$) always plays an important role for knowledge level of farmers. Farmers, who have regular access to different information resources like; sericulture officer or other line departments' officers have more updated knowledge in compare to other. Farmers also have contact with village KPS to gather more information and knowledge about sericulture. Farmers having more mass media exposure ($x_{11}$), like radio, TV, different information bulletin, different cyber extension sources are more updated in knowledge level about sericulture. Again, socio economic status ($x_{14}$) of sericulture farmers has influenced the knowledge level. In sericulture, farmers of higher social status get access to different information resources through different media as well as through different mode. As a result, their knowledge about sericulture is more than other poor farmers.

### 3.4 Analysis of management variable with knowledge level

Employment days per year ($x_{19}$) per labour has significant role for knowledge level of sericulture farmers because most of the farmers themselves are labour also. More the days they work directly in sericulture activities, more will be there knowledge. Therefore, number of employments days has positive significant impact on knowledge level. Remaining management variables didn't show any positive correlation with knowledge level and therefore, they showed established distant relationship with y.

### 3.5 Path analysis and dependencies among the independent variables

The direct, indirect and residual effect of all exogenous variables ($x_1$-$x_{21}$) on the dependent variable knowledge level (y) of sericulture farmers were statistically identified using 'Path analysis' (table3). Results showed the direct effect of $x_{10}$, $x_{12}$ and $x_{19}$ have been substantial and they had occupied the $1^{st}$, $2^{nd}$ and $3^{rd}$ positions respectively, in terms of model values. This result indicates the variables of utilization of information source, economic motivation and days engagement per year are sequentially play impact on knowledge level of the farmers. Again on the other hand, the indirect effect of variables economic motivation ($x_{12}$), socio economic status ($x_{14}$) and utilization of information resources ($x_{10}$) had also been substantial in characterizing the performance of other variables. This implies that the implicit effects of all these variables on the other are

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substantial and imbibing. It has been found that the highest indirect effect of as many as six variables had been routed through the variable economic motivation ($x_{12}$). It means economically motivated farmers are more interested in knowledge gain about sericultural practices and updates. Farmers having target to earn more from sericulture, are more interested to update his or her knowledge level from different sources and different means. That's why economic motivation here gone so reticulate associative that of eight variables out of twenty-one have been drawn upon by economic motivation to influence the knowledge level of the sericulture farmers. The highest indirect effect among the independent variables were identified and found significant in terms of social understanding like in-between marketing support & economic motivation, social participation & education, socio economic status & utilization of information source, and mulberry leaf production & economic motivation. The residual effect is being 0.605, it indicates that even with the combination of these 21 variables 60.50 per cent of the variability of the predicted character, *i.e.* knowledge level could not be explained.

### 3.6 Factor analysis and tendencies among the independent variables

A plan is to be delineated to decrease the socio economic constraints of sericulture through increasing the knowledge level, factor analysis was carried out as a scientific management technique to consider the causal variables as per their importance. The factor analysis was carried out for an intrinsic conglomeration of different 21 independent variables to form a homophyllus group where a total of seven factors were identified (table4). The variation and cumulative percentages of each factors are summarized in table4. The minimum level of factor loading was considered to have such conglomeration and found amongst the variables under factor 1 as 'Social Exposer factor', comprised of education ($x_3$), social participation ($x_8$), training received ($x_9$), economic motivation ($x_{12}$) and marketing support ($x_{13}$). The factor 2 as 'Capability factor' has got the conglomeration of variables within land holding ($x_6$) and area under mulberry cultivation ($x_7$). The factor3 as 'Motivation and economic factor' consists of variables age ($x_1$), mass media exposure ($x_{11}$), types of rearing house ($x_{15}$) and benefit: cost ratio ($x_{20}$). The factor4 as 'Operational factor' had encompassed in between variables number of family member engaged in sericulture activities ($x_{16}$), production of mulberry leaf per unit area ($x_{17}$) and cocoon production ($x_{18}$). Again, the factor5 as 'Experience factor' had reticulated two variables, occupation ($x_2$) and number of years engaged in silkworm rearing ($x_{21}$). The factor6 as 'Social access factor' had conglomerated two variables, utilization of information source ($x_{10}$) and socio-economic status ($x_{14}$) where

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the last one factor7 as 'Labour cost factor' had encompassed two variables, family type ($x_4$) and number of employment days per year per labour ($x_{16}$).

### 3.7 Regression analysis

Regression equations was extracted for knowledge level (y) separately as dependent variable and MDS (Minimum Data Set) as predictor set (table5). The probability of '*F'* value ranged from 0.05 to 0.10. It had been found that the variables utilization of information source ($x_{10}$) and number of family member engaged in sericulture activities ($x_{16}$) were critically effected on the predicted character knowledge level (y). Here, the utilization of various information sources showed impact on the interest of farmers to gather and utilize of different information and thus changing the knowledge level in a desirable direction. The sericulture enterprise by nature is technology oriented, *i.e.* different activities of sericulture need different technologies. Different information sources help the farmers to know about the improved management procedure and technologies so that they can update their knowledge level for their future course of action during sericultural practices. It had been observed that number of family member engaged in sericulture activities ($x_{16}$) as to be one of the most important factor to give impact on the knowledge level (y). Here, in the study area the farmer and his family members who are working under different activities of sericulture and as a result his or her knowledge level about it are increasing day by day. More the number of family members more will be the chances of increase in knowledge level.

## 4. CONCLUSION

In West Bengal, India sericulture is generally practiced by the small and marginal farmers, who are not able to increase the knowledge level due to some social and management factors. The development efforts have not been able to strengthen the hands of these small and marginal farmers resulted derivation to get the optimum benefits for those socio economic and management problems. The assessment of social and management factors associated with farmer's knowledge level in sericulture has been discussed here in this study. Consistency and dependency level in between independent variables were assessed and found discrete and/or random in nature. The exogenous variables showed various model values and variable sorted factors assessed by path and factor analysis, respectively. Regression analysis also identified the independent variable(s) of critical effects on the predicted character knowledge level (y). However, based on this study if

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the identified factors/variables can be taken care in knowledge level, the number of sericulture farmers will be increased in future.

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**Table 1. List of socio-personal and management variables to study the farmer's knowledge level in this study.**

**Table 2. Descriptive statistics of dependent vs independent variables.**

**Table 3. Path analysis amongst the independent variables ($x_1$-$x_{21}$).**

**Table 4. Factor analysis of 21 independent variables ($x_1$-$x_{21}$):**

**Table 5. Stepwise Regression Analysis Knowledge level against all variable data sets.**

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**Figure legends:**

**Fig. 1.** Google map showing the conducted study area of; a) India, national-level view, b) West Bengal, state-level view, c) Administrative district area of Murshidabad, d) district Nadia, e) district South 24 Parganas, and f) district map of West Bengal.

**Fig. 2.** Photographs of survey and visit at district's block level, village Rasulpur, Murshidabad; a) Village information center, b) & c) data collection from actively engaged sericulture farmers, d) mulberry cultivation field for foliage production, e) rearing of silkworm on Chandrika mounting for spinning, f) extracted raw silk by the farmers.

**Fig. 3.** The correlation coefficient (r) of farmers' knowledge level (y) with all independent variables ($x_1$-$x_{21}$) are presented in graphical models. a) the independent socio-personal variables ($x_1$-$x_{14}$), and b) management variables ($x_{15}$-$x_{21}$) were analyzed with the dependent variable (y) using correlation coefficient. The column bar indicates the deviation errors.

**Table 1. List of socio-personal and management variables to study the farmer's knowledge level in this study.**

| Sl. No. | Variables | Symbol | Empirical measurement/Reference |
|---|---|---|---|
| | | ***Socio-personal variables (Independent)*** | |
| **1.** | Age | $x_1$ | Chronological age in years. |
| **2.** | Education | $x_2$ | [10] |
| **3.** | Family size | $x_3$ | Small, medium and large (Scores were assigned by number) |
| **4.** | Family type | $x_4$ | [16] |
| **5.** | Land holding capacity | $x_5$ | Land less, Marginal, Small, Medium and large (Acre). |
| **6.** | Social participation | $x_6$ | [16] |
| **7.** | Occupation | $x_7$ | Full time farming, farming coupled with labor jobs and occupied as laborer (Scores were assigned by number). |
| **8.** | Training received | $x_8$ | Measured by the no. of programme attended by the respondent. |
| **9.** | Utilization of information source | $x_9$ | Schedule developed for study. |
| **10.** | Mass media exposure | $x_{10}$ | [4] |
| **11.** | Extension contact | $x_{11}$ | [21] |
| **12.** | Economic motivation | $x_{12}$ | [20] |
| **13.** | Marketing support | $x_{13}$ | Schedule developed for study |
| **14.** | Socio-economic status | $x_{14}$ | [23] |
| | | ***Management variables (Independent)*** | |
| **15.** | Rearing house type | $x_{15}$ | Kachha, pucca, and mixed. |
| **16.** | Working member in family | $x_{16}$ | Number. |
| **17.** | Mulberry leaf production | $x_{17}$ | Number MT/Acre |
| **18.** | Cocoon production | $x_{18}$ | Number in Kg per 100 dfls. |
| **19.** | Days engaged in sericulture per year | $x_{19}$ | Number. |
| **20.** | Cost benefit ratio | $x_{20}$ | Number. |
| **21.** | Duration in years of engagement in sericulture | $x_{21}$ | Number. |
| | | ***Dependent variable*** | |
| **1.** | Knowledge level | y | [17] |

**Table 2. Descriptive statistics of dependent vs independent variables.**

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| Variables | Mean | Median | Mode | S.D. | Min. | Max. | CV (%) | Remarks |
|---|---|---|---|---|---|---|---|---|
| $x_1$ | 52.09 | 51.00 | 70.00 | 17.30 | 22.00 | 86.00 | 33.21 | Fairly consistent in nature. |
| $x_2$ | 1.20 | 1.00 | 1.00 | 0.40 | 1.00 | 2.00 | 33.33 | Fairly consistent in nature. |
| $x_3$ | 3.41 | 4.00 | 4.00 | 2.01 | 0.00 | 6.00 | 58.94 | Fairly inconsistent in nature. |
| $x_4$ | 1.27 | 1.00 | 1.00 | 0.44 | 1.00 | 2.00 | 36.36 | Fairly consistent in nature. |
| $x_5$ | 4.24 | 4.00 | 4.00 | 1.43 | 2.00 | 10.00 | 33.72 | Fairly consistent in nature. |
| $x_6$ | 0.54 | 0.47 | 0.50 | 0.58 | 0.00 | 5.00 | 01.07 | Highly consistent in nature. |
| $x_7$ | 0.29 | 0.14 | 0.50 | 0.49 | 0.00 | 5.00 | 01.68 | Fairly consistent in nature. |
| $x_8$ | 1.38 | 1.00 | 2.00 | 0.65 | 0.00 | 2.00 | 47.10 | Consistent in nature. |
| $x_9$ | 1.18 | 1.00 | 1.00 | 0.73 | 0.00 | 2.00 | 61.86 | Fairly inconsistent in nature. |
| $x_{10}$ | 34.97 | 35.00 | 40.00 | 6.76 | 4.00 | 44.00 | 19.33 | Fairly consistent in nature. |
| $x_{11}$ | 6.54 | 6.00 | 6.00 | 3.30 | 2.00 | 16.00 | 50.45 | NOT consistent in nature. |
| $x_{12}$ | 24.35 | 28.00 | 29.00 | 6.89 | 5.00 | 30.00 | 28.29 | Consistent in nature. |
| $x_{13}$ | 5.30 | 5.00 | 8.00 | 2.18 | 2.00 | 9.00 | 41.13 | Consistent in nature. |
| $x_{14}$ | 5.72 | 6.00 | 4.00 | 1.84 | 2.00 | 9.00 | 32.16 | Moderately consistent in nature. |
| $x_{15}$ | 1.18 | 1.00 | 1.00 | 0.39 | 1.00 | 2.00 | 33.05 | Consistent in nature. |
| $x_{16}$ | 3.73 | 4.00 | 4.00 | 1.43 | 1.00 | 8.00 | 38.33 | Moderately consistent in nature. |
| $x_{17}$ | 2894.28 | 3080.00 | 3090.00 | 1137.71 | 700.00 | 6000.00 | 39.30 | Moderately consistent in nature. |
| $x_{18}$ | 121.02 | 120.00 | 112.00 | 22.99 | 59.00 | 159.00 | 18.99 | Highly consistent in nature. |
| $x_{19}$ | 128.18 | 134.00 | 135.00 | 14.12 | 85.00 | 150.00 | 11.01 | Very much consistent in nature. |
| $x_{20}$ | 0.54 | 0.57 | 0.58 | 0.10 | 0.24 | 0.92 | 18.51 | Highly consistent in nature. |
| $x_{21}$ | 19.94 | 15.00 | 15.00 | 15.19 | 2.00 | 72.00 | 76.17 | Inconsistent in nature. |
| y | 30.51 | 31.00 | 30.00 | 1.568 | 20.00 | 34.00 | 5.139 | Consistent in nature. |

**Table 3. Path analysis amongst the independent variables ($x_1$-$x_{21}$).**

| Variables. | Total Effect | Direct Effect | Indirect Effect | Highest Indirect Effect |
|---|---|---|---|---|
| $x_1$ | 0.181 | 0.180 | 0.001 | 0.043($x_{10}$) |
| $x_2$ | -0.073 | -0.185 | 0.112 | 0.051($x_3$) |
| $x_3$ | 0.230 | 0.208 | 0.022 | -0.101($x_{12}$) |
| $x_4$ | 0.018 | -0.036 | 0.054 | 0.040($x_{17}$) |
| $x_5$ | -0.033 | 0.053 | -0.086 | -0.047($x_3$) |
| $x_6$ | -0.180 | -0.049 | -0.131 | -0.071($x_{17}$) |
| $x_7$ | -0.087 | -0.004 | -0.083 | -0.040($x_6$) |
| $x_8$ | 0.251 | 0.121 | 0.130 | 0.128($x_3$) |
| $x_9$ | 0.294 | 0.143 | 0.151 | 0.104($x_3$) |
| $x_{10}$ | 0.424 | 0.234 | 0.190 | 0.039($x_{19}$) |
| $x_{11}$ | 0.238 | 0.081 | 0.157 | 0.069($x_1$) |
| $x_{12}$ | -0.107 | 0.213 | -0.320 | -0.106($x_{17}$) |

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| | | | | |
|---|---|---|---|---|
| $x_{13}$ | -0.020 | 0.108 | -0.128 | 0.149($x_{12}$) |
| $x_{14}$ | 0.240 | -0.040 | 0.280 | 0.121($x_{10}$) |
| $x_{15}$ | -0.062 | -0.165 | 0.103 | -0.050($x_{12}$) |
| $x_{16}$ | -0.048 | -0.016 | -0.032 | 0.104($x_{12}$) |
| $x_{17}$ | -0.131 | -0.198 | 0.067 | 0.114($x_{12}$) |
| $x_{18}$ | -0.186 | -0.085 | -0.101 | 0.091($x_{12}$) |
| $x_{19}$ | 0.365 | 0.218 | 0.147 | 0.083($x_3$) |
| $x_{20}$ | -0.081 | -0.004 | -0.077 | -0.070($x_3$) |
| $x_{21}$ | -0.066 | -0.083 | 0.017 | -0.041($x_{10}$) |

**Residual effect: 0.605*

**Table 4. Factor analysis of 21 independent variables ($x_1$-$x_{21}$)**

| Factor No. | Variables | Factor loading | % of variance | Cumulative % | Factor renamed |
|---|---|---|---|---|---|
| **1** | Education<br>Social participation<br>Training received<br>Economic motivation<br>Marketing support | .800<br>.825<br>.609<br>-.537<br>-.745 | 21.351 | 21.351 | Social Exposer |
| **2** | Land holding<br>Area under mulberry cultivation (acre) | .914<br>.944 | 11.124 | 32.475 | Capability factor |
| **3** | Age<br>Mass media exposure<br>Types of rearing house<br>Benefit : cost ratio | .717<br>.694<br>.629<br>.528 | 10.188 | 42.663 | Motivation and economic factor |
| **4** | No. of family member engaged in sericulture activities<br>Production of mulberry leaf per unit area (kg)<br>Cocoon production in KG | .608<br>.571<br>.804 | 8.796 | 51.459 | Operational factor |
| **5** | Occupation<br>No. of years engaged in silkworm rearing | -.683<br>.726 | 6.445 | 57.904 | Experience factor |
| **6** | Utilization of Information source<br>Socio-economic status | -.896<br>-.685 | 5.665 | 63.569 | Social access factor |
| **7** | Family type<br>No of employment days / year / labour | .729<br>.592 | 5.133 | 68.702 | Labour cost factor |

**Table 5. Stepwise Regression Analysis of Knowledge level against all variable data sets.**

1. $Y = 23.260 + 0.086\ x_{10}^{**} + 0.033\ x_{16}^{**}$

$[R^2 = 0.266$ , Adj. $R^2 = 0.254$, SE (est) =1.35379]

Note: [**:P<0.01 *:P<0.05]

UNDER PEER REVIEW


**Fig. 1. Google map showing the conducted study area of; a) India, national-level view, b) West Bengal, state-level view, c) Administrative district area of Murshidabad, d) district Nadia, e) district South 24 Parganas, and f) district map of West Bengal.**

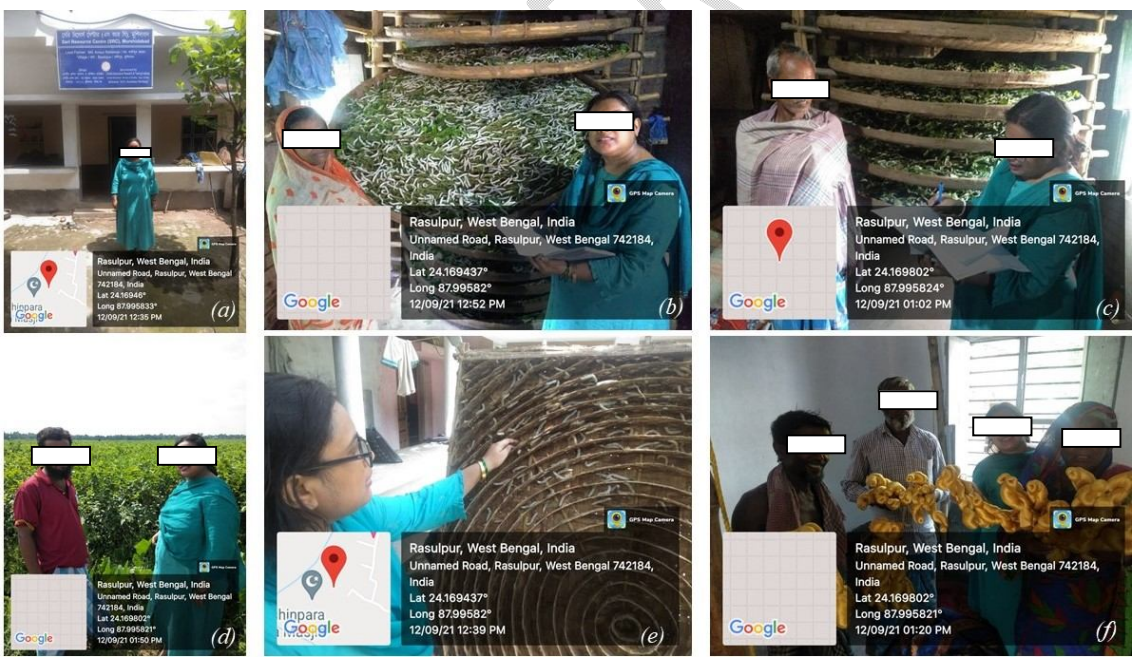


**Fig. 2. Photographs of survey and visit at district's block level, village Rasulpur, Murshidabad; a) Village information center, b) & c) data collection from actively engaged sericulture farmers, d) mulberry cultivation field for foliage production, e) rearing of silkworm on Chandrika mounting for spinning, f) extracted raw silk by the farmers.**


**Fig. 3. The correlation coefficient (r) of farmers' knowledge level (y) with all independent variables ($x_1$-$x_{21}$) are presented in graphical models. a) the independent socio-personal variables ($x_1$-$x_{14}$), and b) management variables ($x_{15}$-$x_{21}$) were analyzed with the dependent variable (y) using correlation coefficient. The column bar indicates the deviation errors.**