# IMPACT EVALUATION OF DEVELOPMENT PROJECTS - A CASE STUDY OF PROJECT "DEVELOPMENT OF SERICULTURE ACTIVITIES IN PUNJAB"

S. Mubin, M. Ahmed, G. Mubin* and M. A. Majeed**

Directorate General of Monitoring and Evaluation, Planning & Development Department
*PEF, Govt. of Punjab
**Lahore Leads University, Lahore

**ABSTRACT:** Sericulture is a short gestated (40 days) and labor intensive cottage industry which can be helpful to alleviate poverty in the rural areas. In Punjab province of Pakistan, sericulture activities were introduced under Forest Department, Govt. of Punjab since 1975. In 2006, a project titled "Development of Sericulture Activities in Punjab" was initiated with a cost of Rs. 66.073 million for the duration of 48 months to strengthen the already existing setup and to promote the sericulture activities in the rural areas of Punjab. The project envisaged distribution of silk seed packets at subsidized cost, along with necessary training to jobless and marginalized rural people to engage them in the silkworm rearing practices. Mulberry nurseries (total 1,380 acres) were also raised at the project area locations on the state and private lands to provide mulberry leaves to the silk rearing farmers at a nominal cost. Directorate General of Monitoring and Evaluation (DGM&E) conducted an ex-post evaluation of the project to check impact on the targeted stakeholders (rural public). A well structured instrument was designed to collect data from randomly selected households from these locations. Data was collected as per designed survey plan. The data was analyzed by using Statistical Package of Social Sciences (SPSS 15.00) and conclusion and recommendations were drawn. The relationship among these variables was studied using appropriate statistical techniques. Results and recommendations are shared in the last section of the paper.

**Key words:** Socio-economic development, Sericulture, Punjab (Pakistan), Impact Evaluation.

## INTRODUCTION

Systematic Evaluation of Development projects and programs was conceived and formulized back from 1960s till date by donor agencies to assess the projects performance and impacts. Similarly, Government of the Punjab established a full-fledged Directorate in 2008 to monitor and evaluate ongoing and completed development projects to ensure that all the objectives must be accomplished and standard operating procedures (SOPs) have been met. For evaluation purposes, after completion of project, Forest Department submitted PC-IV of this project on October 2010. Initially approved cost of this project was Rs. 62.632 million which was subsequently revised to Rs. 66.073 million with a gestation period of 48 months. The total planned cost included Capital and Revenue components of Rs. 15.145 million and 50.928 million respectively. Year wise financial phasing of the project showing 5%, 47% 33% and 15% of total project cost for the year 2006-07, 2007-08, 2008-09 and 2009-10 respectively.

The practice of raising silkworm is known as sericulture. The discovery of silk production dates to about 2700 B.C. Sericulture is one of the most important cottage industries in a number of countries like China, Japan, India, Korea, Russia, Italy and France. Apart from silk, there are several other by-products from sericulture and mori culture activities e.g. herbal medicine, handmade twigs products, fodder for cattle, for soil preservation. Sericulture development provides opportunities to improve the living standards of people in the rural area in developing countries. In Pakistan, sericulture industry has limited growth mainly due to poor quality of mulberry leaves and silk seed. Thus the cultivation of mulberry is one of the most important factors in the production of silkworm eggs, rearing of silkworm cocoons and on the whole in the entire operation of sericulture.

## MATERIALS AND METHODS

Hussain *et al*. (2010) explored that availability of silkworms and mulberries is related to climate and ecological conditions (rainfall, temperature, relative humidity, soil quality, etc.). According to altitude and longitude, sericulture is practiced in regions between the 300 and the 350 northern latitude in humid to sub humid tropics. The large genetic variability concerning mulberries as well as silkworms opens up many possibilities for breeding and selection. Pakistan has, in some area very favorable climate for rearing of sericulture. Efforts have been made in the past to promote sericulture activities in Punjab by the Agriculture and Forestry Department from 1975 but no promising results

have been obtained. Not much research has been conducted in Pakistan for development and evaluation of sericulture activities even though there is are full fledge sericulture research center established in Lahore, Khushab and Murree under admin control of Forest Department for the production of better quality of silk seed which produce cocoon free from disease to generate high volume of silk. Hussain *et al*. (2010) worked for the Evaluation of genetic potential of inbred pure lines of silkworm for breeding and cocoon production in Pakistan. The main idea of this paper is to increase the production of best cocoons in quality and quantity for a high yielding cocoon crop. The information yield in this study would be useful for future breeding programs and commercial raising of sericulture activities in Punjab. Further the data analyzed by using the evaluation index method each breed was maintained in three replications. Despite of these efforts success was not attained in sericulture and mori culture activities in Punjab. For this purpose a development project was initiated by Forest department, Government of the Punjab to strength the activities of sericulture in the province to change the socio-economic conditions of rural folk. After completion, project was submitted to DGM&E for evaluation. It was very difficult to design evaluation as similar work had not been done in Pakistan.

A similar Nature of project was evaluated in Thailand by Robert (1975) and a comprehensive report titled "Evaluation and Design of Sericulture Project in Public Welfare Land Settlements (Thailand)" was prepared. In evaluation report he concluded that the project increased the income of bivoltine sericulture farmers and reelers from sericulture and increases in the production of quality raw silk (above 2A level). In addition, positive impacts beyond the project area were observed.

Evaluation team of DGM&E took guidance from above referred material while designing an evaluation methodology to know how much the project under discussion has uplifted the socio-economic conditions of the rural poor of Punjab province of Pakistan?. It was also tried to know through instrument (questionnaire) how much sericulture has developed in Punjab after this intervention and why previous efforts in this regards were not fruitful? Evaluation team was also supposed to know about the pros and cons of sericulture activities in Punjab due to which this idea has not been successful in Pakistan; however, it is fairly working in other countries of similar topography, culture and climate.

**Research Methodology:** Keeping in view the importance of the project's impact, the evaluation team mainly focused on the impact evaluation of the project.

1. **Impact Evaluation:** Measuring the change in the lives of beneficiaries after completion of this project.

To measure the impact of the project activities on the project beneficiaries different key indicators were defined to collect the information which helps to measure the impact of the sericulture activities on farmer's income, education and spending etc. The detailed list of defined impact assessment indicators is given in Table-1.

**Table 1: Indicators of Impact Assessment**

| Impact Indicators | Description |
|---|---|
| **Age & Gender** | %age of Male or Female, age of beneficiary |
| **Education** | The education level of beneficiaries |
| **Motivation for silk rearing** | The reason due to which beneficiary is involved in silk rearing activities |
| **Experience of Silk rearing** | For how many tears beneficiary is involved in Silk rearing? |
| **Level of Income** | Monthly income of the families of beneficiaries in Pak Rupees |
| **Availability of Silk Seed** | Satisfaction of beneficiaries in availability to silk seeds |
| **Quality of Silk seed** | Satisfaction of beneficiaries on the quality of silk seeds |
| **Availability of food (Mulberry Leaves)** | Satisfaction of beneficiaries in availability of food (Millbury Leaves) for the silk worms and any difficulty faced by the beneficiaries in obtaining food for silk worms |
| **Training & Quality of Training** | No. of and quality of the trainings provided to the farmers for silk rearing |
| **Production & Quality of Production** | Production (quality and quantity) of cocoons by beneficiaries. |
| **Income Generated through sericulture** | Level of income generation through sericulture activities. |
| **Use of Income Generated through Sericulture** | What are the needs on which income was utilized? |

**Data Collection:** A comprehensive statistical study was carried out to collect the data from the sericulture farmers/ households involved in silkworm rearing from six districts of Punjab i.e. Kasur, Khushab, M.B. Din,

Sahiwal, Sargodha, T.T. Singh. Simple Random Sampling was used to approach the selected households in six districts of the Punjab. Total sample of 1000 questionnaire were filled from the selected districts. Table-2 displays the distribution of data collection through questionnaire in selected districts which is proportionally based on the number of beneficiaries in each district.

**Table-2: District Wise Detail of Sample Questionnaire**

| Districts | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Kasur | 390 | 39 | 39% | 39 |
| Khushab | 100 | 10 | 10% | 49 |
| M.B. Din | 160 | 16 | 16% | 65 |
| Sahiwal | 190 | 19 | 19% | 84 |
| T.T. Singh | 70 | 7 | 7% | 93 |
| **Total** | **1000** | **100.0** | **100.0** | **100.0** |

**Data analysis**: Analysis of the data was made in two perspective i.e. (i) Descriptive nature and (ii) Inferential nature. The analysis has been made based on the data obtained from beneficiaries on questionnaires filled from six districts of Punjab. The data collected has been analyzed using Statistical Package of Social Sciences (SPSS 15.00).For descriptive analysis of the data M.S Excel graphs have been used to demonstrate the trends wherever applicable. Relationship among these variables is studied using appropriate statistical techniques like cross tabulation, percentages, averages and trend analysis.

While on the other hand for inferential analysis of the data following chi-square test statistics have been used to test the hypothesis about the different indicators.

$$\chi^2 = \sum_{i=1}^{r}\sum_{j=1}^{c}\frac{(o_{ij} - e_{ij})^2}{e_{ij}}$$

i.e. $$e_{ij} = \frac{(A_i)(B_j)}{n}$$

it follows chi-square distribution under null hypothesis with (r-1)(c-1) degrees of freedom.

## RESULTS AND DISCUSSION

**Descriptive Analysis:** The descriptive results for key indicators have been shown in the ensuing paragraphs.

**i. Gender, Age, and Education Level:** Based on the analysis, it was observed that mostly sericulture farmers were women. About 76% of randomized respondents of survey were women. Most of the respondents were the head of the household (71 percent). Silk rearing activities are usually done by females and male do their jobsfor additional source of livelihood. Mean of age of respondent was 37.04 years, ranging from 14 to 80 years. 44 percent of the respondents were found between age from 14 to 33 both inclusive. 45 percent of the respondents were found between age from 34 to 53 and 6 percent of the respondents between age of 54 to 73 both inclusive. Only 2 percent respondents involved in silk seed rearing were illiterate. 23 percent and 30 percent of respondents involved in silk rearing were having primary and middle school education level respectively. 15 percent of respondents involved in silk rearing were having metric ($10^{th}$ grade) education level and 5 percent of respondents were those having educational qualification equivalent to intermediate level.

**ii. Motivation for Silk Rearing:** As much as86 percent opined that they were involved in silk rearing for income generation to have better economic benefit by using domestic efforts collectively. However, 14 percent of respondents opined various other motivation factors such as learning and skill development, loan payments, and personal interest and habit etc were the main factor to motivate them for silk rearing.

**iii. Experience of Silk Rearing:** With reference to the experiences in silkworm rearing, 58 percent of the respondents were involved in silk rearing for more than five years. However, 14 percent of the respondents were those who were having two years of experience and only 8 percent were having one year or less experience. This shows failure of the Sericulture department to attract more silk rearing farmers in recent years.

**iv. Income Level:** Income level was compared before and after the intervention. Before the start of intervention, 68.7 percent of the respondents were falling in the bracket of less than or equal to Rs. 6,000 per month. 16 percent of the respondents were having monthly income equivalent to Rs. 8,000 whereas, only 15 percent respondents were those having monthly income Rs. 10,000 or above. However, after the intervention, 44.6 percent of the target respondents were having income less than or equal to Rs. 6,000 per month h. 30.7 percent of the respondents were having monthly income equivalent to Rs. 8,000, whereas, 24.7 percent respondents were those having monthly income Rs. 10,000 or above i.e. more than 116.5 US dollars per month. Though in absolute dollar value their income has been dropped as Pak rupee has devaluated in terms of Pak rupees, intervention has created a good impact in terms of income level.

**v. Availability of Silk Seed:** It was objective of the evaluation team to find that list of beneficiaries provided by Forest Department is correct and all the beneficiaries of the scheme got the silk seed from Forest Department. Based on the analysis, 97 percent of the farmers got the silk seeds from the Forest Department and 3 percent were those which were never involved in sericulture activities.

Almost all of the respondents of the survey purchased one silk seed packet at the subsidized cost of Rs. 350/bag.

**vi. Quality of Silk Seed:** Almost 44 percent said that the quality of seed was good. 46 percent of the respondents were in view that the Forest Department provided average quality of silk seed and it didn't produce silk what they were expecting. However, 10 percent of respondents told that the quality of silk seed was extremely poor and they were not able to rear silk seed despite of their hardship and labor and all silk worms were died due to low disease resistance.

**vii. Availability of Food for Silkworms:** A 12% of the responding farmers were those which were arranging mulberry leaves (food for silkworms) by their own sources while the remaining were purchasing it from the Forest Department at a permit fee of Rs. 150. Important finding of the study is that the 38 percent of the farmers' claimed that they found difficulties and hindrance by the officials of the Forest Department in getting mulberry leaves. However, 63 percent of the respondents claimed that they found no difficulty in getting mulberry leaves from Forest Department.

**viii. Training of the Farmers regarding Sericulture activities and Quality of Training:** A 63 percent of the respondents of the survey were trained during the project period. About 85 percent of the trained farmers were satisfied with the quality of the training provided by the department whereas, 10 percents respondents were not satisfied by the training provided by the representative of Forest Department, whereas, 5 percent didn't respond to this question.

**ix. Production and Quality of Production:** About 93.6 percent of the respondents were successfully able to produce silk cocoon from seeds, whereas 6.4 percent failed to rear or complete the process to produce final product i.e. silk. Production wise complete breakup of farmers is shown in table3.

**Table-3: Descriptive Analysis of Production of Cocoons**

| Variable | N | Percentage | Remarks |
|---|---|---|---|
| **Quantity of Cocoon produced (Kgs)** | | | |
| 0 kg | 64 | 6.4 | Mini |
| Up to 10 kg | 67 | 6.7 | Produced=0 |
| Up to 15 kg | 101 | 10.1 | Maxi |
| Up to 20 kg | 241 | 24.1 | Produced |
| Up to 25 kg | 288 | 28.8 | 40 kg or |
| Up to 30 kg | 142 | 14.2 | more. |
| Up to 35 kg | 62 | 6.2 | Average |
| 40 kg and more | 35 | 3.5 | Weighted Production = 22kg |

**x. Income Generated through Sericulture:** Responding to the question of per kg sale of cocoon, minimum sale price of cocoon was found in survey was Rs. 160 and maximum selling price was Rs. 350. By average, respondents were selling cocoon @ Rs. 290/- per kg. 63 percent of the respondents sold cocoon in the market, whereas, 37 percent of respondents sold their cocoon to the special buyers (middle men) in their respective villages as shown in table 4.

**Table-4: Descriptive Analysis to per kg selling of cocoons by farmers**

| Variable | N | Percentage | Remarks |
|---|---|---|---|
| **Price at which Cocoon Sold** | | | |
| Rs. 160 | 54 | 5.4 | |
| Rs. 250 | 103 | 10.3 | Average |
| Rs. 275 | 208 | 20.8 | Weighted |
| Rs. 290 | 459 | 45.9 | Price per |
| Rs. 300 | 91 | 9.1 | kg = Rs. |
| Rs. 325 | 41 | 4.1 | 290 |
| Rs. 350 | 44 | 4.4 | |

**xi. Use of Income Generation through Sericulture:** Most of the respondents (95%) were of the view that sericulture activities have a significant impact on family income, these families utilize the income generated through these activities on clearing loans, purchase of assets, education of their children, sustaining livings, marriages of their children and buying cattle's etc as shown in table 5.

**Table-5: Descriptive Analysis to assess Impact of Sericulture Activities on Family Income**

| Variable | N | Percentage | Remarks |
|---|---|---|---|
| **Purposes of Income** | | | |
| To Clear Loan | 60 | 6 | |
| To Buy Cattle | 99 | 9.9 | |
| For Education of Children | 39 | 3.9 | |
| To Sustain Living | 530 | 53 | |
| For Marriages of Children | 272 | 27.2 | |

**xii. Economic return of Sericulture:**

**Investment (for forty days)**

- Cost of Silk Seed Packet = Rs. 350
- Cost of forty days labor (2 hours per day) = 50* 2*40 = Rs. 4,000
- Mulberry leaves (food for worms) = Rs. 300

**Total Investment = Rs 4,650**

**Return after 40 days:** Return @ 22 kg * 290 (average production * average selling price) = Rs. 6,380

Based on above analysis, return of sericulture activities is about 37% higher than its investment.

**Inferential Analysis:** This inferential analysis was developed on the basis of prior knowledge vis-a-vis association of factors involved in sericulture activities e.g. education of the beneficiaries (farmers), income of the households/farmers, training of farmers from Forest Department and production level of Cocoon. The null hypotheses (Ho) using p<= 0.10 was determined as under:

- There exists a positive association between education of the farmer and production level of Cocoon;
- There exist a positive association between the education and income of the farmer; and
- There exist a positive association between training of the farmer from Forest Department and production level of Cocoon.

The alternate hypothesis H1 was assumed that there does not exist any association between these factors. The parameters were tested using a well known non-parametric chi-square test statistics. The calculated values of chi-square statistics for first two hypotheses were $\chi^2 = 8.644$ with 2 degrees and $\chi^2 = 17.713$ with 9 degrees respectively. The calculated p-vales were $p = 0.013$ and $p = 0.60$ respectively indicated that at 10% level of significant there exist a significant statistical association between education of the farmer & production level of Cocoon and education and in come of the farmer. While on the other hand for third hypothesis the calculated value of chi-square statistics were $\chi^2 = 0.399$ with 2 degrees with p-value $p = 0.844$ indicated that insignificant relationship between training of the farmer and production level of cocoon may illustrate low quality training delivered by officials under the project.

**Recommendations**

1. Sericulture activities are useful for income generation to marginalize and poor people of rural areas of Punjab. Its economic return is higher than its investment.
2. Forest department should try to improve the quality of silk seed.
3. Forest department should invest more in terms of time and costs to publicize the idea/mechanism of silk rearing to attract new farmers and bring them in the network.
4. Sericulture activities may be used as tool for women development and empowerment in rural areas of Punjab.
5. Forest department should improve the mechanism for distribution of silk seed packet to ensure fair distribution of all silk packets to beneficiaries.
6. For the better quality of silk, continuous supply of food is very important. It has been observed during site visits that mulberry leaves were not abundantly available for farmers for silk rearing. Forest department should take necessary action to properly maintain already existing mulberry plantation to make mulberry leaves available to the silk rearing farmers.
7. Forest department may reduce the cost of silk seed packet from Rs. 350/- to between Rs. 50/- to 100/ to exploit the true concept of sustainable economic development, so that more marginalized people can be broughtin the network of sericulture farmers to rear more packets of silk seed.
8. Particularly, in this type and scale of sericulture activities in the country, the role of good training cannot be denied. It is, therefore, strongly recommended to initiate micro level training with the participation of local targeted community. Moreover, trainers must be trained to transfer knowledge efficiently and effectively.
9. For this project, it is very difficult to continue M&E activities due to non availability of project data and information about project beneficiaries. Department should maintain data base of silk rearing farmers (beneficiaries) in soft as well as hard form with pre-requisite information e.g. phone numbers (if available), complete address with location map and photographs of farmers (if applicable with the consent of farmer). Preferably, a complete file to be prepared for each packet for record and follow-ups. This approach has been witnessed successful in other social sector projects.
10. Department should publicizeproperly about the sericulture and related activities, in print and electronic media on continual basis. Those farmerswho did not have any knowledge of sericulture of a particular location should gathered into single group and department nominate the experienced farmer as a leader of the group who helps the new farmers and discuss their experiences and problems with the newly entered farmer in sericulture activities.
11. The inferential analysis indicated the positive association between production of Cocoon and education of the farmers i.e. more the education level of the farmers, higher the production rate of cocoon. Therefore, it is recommended to involve more educated people/farmers in the silk rearing activities for better quality and quantity of silk.

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