

Chapter-7

Summary and Conclusion

Moumita Gupta, S K Acharya, A Biswas and G C Mishra

Bamboos offer a wide range of potential solutions to address the problems and hardships that may come with climate change. Bamboos can be integrated into land use based climate change mitigation activities, such as a forestation / reforestation or avoided deforestation. Bamboos are amongst the fastest growing plants in the world. Studies showed that appropriately managed and regularly harvested bamboo stands can sequester more carbon than if left in their natural state, and moreover, can sequester more carbon than fast-growing tropical and sub-tropical trees in comparable conditions. Due to its renewability, bamboo can take pressure of other forest resources and contribute to avoided deforestation. Bamboos unique potential contribution to mitigation relies on the fact that it can combine continued biomass production with regular selective harvesting, thus leaving a standing carbon stock and a living ecosystem that will continue to grow. Moreover, when bamboos are used to substitute for energy intensive products, their growing stock can represent an increasing carbon sink. Longer life spans of modern bamboo products will help ensure that more carbon remains sequestered. Increasing the cultivation and use of bamboos is likely to contribute to improving the resilience of rural and urban populations to the impacts of climate change. Bamboos are relatively easy to grow and maintain and can provide additional food, energy and income security to the rural poor, as well as a range of environmental services and uses in their growing and harvested forms. Bamboo products, such as houses and charcoal, can contribute to the livelihood resilience of rural and urban dwellers.

Tripura is called the 'home' of bamboo. The wonder plant is intimately interwoven in the socio-cultural fabric of the State. Bamboo based

economic activities are an intrinsic part of life; the importance of the resource in the State's predominantly agrarian economy is well recognized. Bamboo finds many uses, and is a major source of income and employment as well. It is estimated that 2.46 lakh families in the State are engaged in bamboo related vocations. About 19 bamboo species are found in Tripura. To realize the economic, social and environmental potential of the bamboo resource of Tripura, develop in into one of major economic sectors of the State, and provide employment and income generating activities for the tribal and rural poor. On this background the present study was conducted with the following objectives:

- i. To assess the productive performance of bamboo enterprise in terms of Income, Productivity and livelihood.
- ii. To assess the agro-economic, socio-personal and management characteristics of respondents as the causal variables.
- iii. To conduct participatory analysis of different attributes of bamboo enterprise.
- iv. To assess and evaluate the relation between the causal and consequent variables both at inter and intra level.
- v. To derive some strategies for micro level interventions.

The research has been carried out in village Sharat chowdhury para of Hezamara block, West district of Tripura. Regarding methodology, following steps are followed:1)Locale of study,2)Sampling design, 3)Pilot study,4)Variables and measurements, 5)Method of data collection,6)Statistical tools used for analysis and interpretation of data.

The purposive as well as random sampling techniques were adopted for the present study. It may be termed as multistage random sampling procedure. The state, district, block and village were purposively selected for the study. From the 96 respondent were selected randomly for the final data collection.

Family income from bamboo enterprise, Family Income from agricultural enterprise, Productivity of bamboo Mandays and Wages generation from Bamboo enterprise were the five dependent variables. Numbers of total independent variables were 19. The independent variables were catalogued

as socio-personal, agro-economic and techno-managerial variables. The statistical tools used for the analysis are as follows-

Mean, Standard deviation, Coefficient of variation, Correlation coefficient, Path analysis, Factor analysis, Stepwise regression analysis, Logical regression analysis and Canonical correlation analysis.

7.1 FINDINGS OF THE STUDY

Descriptive Statistics

General description of 19 independent variables and five dependent variables presents the Mean, minimum and maximum value, Standard deviation and coefficient of variance.

Correlation Coefficient:

Family income from Bamboo enterprise (Y₁)

It has been found that the following variables have been emerged as the significant predictors of income from bamboo enterprise(Y₁), and these predictor variables are family size(X₃),land under agricultural crop(X₇), land under bamboo(X₉), number of rhizome planted(X₁₃),number of rhizome grew to the fullest(X₁₄), energy consumption(X₁₆), cost incurred in bamboo cultivation(X₁₈).

Family income from Agricultural enterprise (Y₂)

It has been found that the following variables have been emerged as the significant predictors of income from agricultural enterprise(Y₂), and these predictor variables are family size(X₃),homestead land(X₆),land under agricultural crop(X₇), land under bamboo(X₉),Annual income before bamboo(X₁₁), energy consumption(X₁₆), cost incurred in bamboo cultivation(X₁₈).

Productivity of Bamboo (Y₃)

It has been found that the following variables have been emerged as the significant predictors of Productivity of bamboo(Y₃), and these predictor variables are family size(X₃),land under agricultural crop(X₇), land under bamboo(X₉), number of rhizome planted(X₁₃),number of Rhizome grew to the fullest(X₁₄), energy consumption(X₁₆), cost incurred in bamboo cultivation(X₁₈).

Mandays generated from Bamboo Enterprise (Y₄)

It has been found that the following variables have been emerged as the significant predictors of Mandays generated from bamboo enterprise(Y₄), and these predictor variables are family size(X₃),land under agricultural crop(X₇), land under bamboo(X₉),Annual income before bamboo(X₁₁), energy consumption(X₁₆), cost incurred in bamboo cultivation(X₁₈).

Wages generated from Bamboo Enterprise (Y₅)

It has been found that the following variables have been emerged as the significant predictors of Wages generated from bamboo enterprise(Y₅), and these predictor variables are family size(X₃),land under agricultural crop(X₇), land under bamboo(X₉),Annual income before bamboo(X₁₁), energy consumption(X₁₆), cost incurred in bamboo cultivation(X₁₈).

Logistic Regression analysis

In the estimation of cause effect relationship between the Family income from bamboo enterprise (Y₁) and 19 causal variables, the beta x R presents the Parental contribution of the causal variable on the respective consequent variable in the total interaction. It is interesting to note that the R² value stands at 0.9899 to imply that almost entity of the variance has been explained by this causal variable Land under bamboo(X₉).

In the estimation of cause effect relationship between the Family income from Agricultural enterprise (Y_2) and 19 causal variables, the beta x R presents the Parental contribution of the causal variable on the respective consequent variable in the total interaction. It is to note that the R^2 value stands at 0.7300.

In the estimation of cause effect relationship between the Productivity of bamboo (Y_3) and 19 causal variables, the beta x R presents the Parental contribution of the causal variable on the respective consequent variable in the total interaction. It is to note that the R^2 value stands at 0.7734.

In the estimation of cause effect relationship between the Mandays generated from bamboo enterprise (Y_4) and 19 causal variables, the beta x R presents the Parental contribution of the causal variable on the respective consequent variable in the total interaction. It is interesting to note that the R^2 value stands at 0.9246 to imply that almost entity of the variance has been explained by this causal variable Family size(X_3).

In the estimation of cause effect relationship between the Wages generated from bamboo enterprise (Y_5) and 19 causal variables the beta x R presents the Parental contribution of the causal variable on the respective consequent variable in the total interaction. It is interesting to note that the R^2 value stands at 0.9254 to imply that almost entity of the variance has been explained by this causal variable Family size(X_3).

Stepwise Regression analysis:

Cost of farm implements when purchased (X_4), land under bamboo(X_9), Energy consumption(X_{16}), are the 3 most important causal variable to interpret the variance embedded with the Family income from Bamboo enterprise(Y_1).

Family size (X_3), land under agricultural crop(X_7), land under bamboo(X_9), are the 3 most important causal variables to interpret the variance embedded with the Family income Agricultural enterprise(Y_2). land under

bamboo(X_9), are the most important causal variables to interpret the variance embedded with the Productivity of bamboo(Y_3).

Family size (X_3), Land under agricultural crop(X_7), Cropping intensity(X_8), Material possessed(X_{10}), Energy consumption(X_{16}), Cost incurred in bamboo cultivation(X_{18}) are the 6 most important causal variables to interpret the variance embedded with the Mandays generated from bamboo enterprise(Y_4).

Age(X_1), Family size (X_3), Land under agricultural crop(X_7), Energy consumption(X_{16}), Cost incurred in bamboo cultivation(X_{18}) are the 6 most important causal variables to interpret the variance embedded with the Wages generated from bamboo enterprise(Y_5).

Path Analysis:

Income from Bamboo enterprise (Y_1):

It has been found that the variable land under bamboo(X_9) has exerted the highest direct effect to characterize the Family income from Bamboo enterprise (Y_1). The variable cost incurred in bamboo cultivation(X_{18}) has also been exerted the highest indirect effect and the variable land under bamboo(X_9) has rooted highest indirect effect of all the variables to ultimately functionalize the performance of Family income from bamboo enterprise (Y_1).

Family income from Agricultural enterprise (Y_2):

It has been found that the variable land under agricultural crop(X_7) has exerted the highest direct effect to characterize the Family income from agricultural enterprise (Y_2). The variable Energy consumption(X_{16}) has also been exerted the highest indirect effect and the variable land under agricultural crop(X_7) has rooted highest indirect effect of all the variables to ultimately functionalize the performance of Family income from agricultural enterprise (Y_2).

Productivity of Bamboo (Y₃):

It has been found that the variable land under bamboo(X₉) has exerted the highest direct effect to characterize the Productivity of bamboo (Y₃).The variable Cost incurred in bamboo cultivation(X₁₈) has also been exerted the highest indirect effect and the variable land under bamboo(X₉) has rooted highest indirect effect of all the variables to ultimately functionalize the performance of Productivity of bamboo (Y₃).

Mandays generated from Bamboo Enterprise (Y₄):

It has been found that the variable family size(X₃) has exerted the highest direct effect to characterize the Mandays generation from Bamboo enterprise (Y₄) .The variable land under bamboo(X₉) has also been exerted the highest indirect effect and the variable family size(X₃) has rooted highest indirect effect of all the variables to ultimately functionalize the performance of Mandays generation from Bamboo enterprise (Y₄).

Wages generated from Bamboo Enterprise (Y₅):

It has been found that the variable family size(X₃) has exerted the highest direct effect to characterize the Wages generation from Bamboo enterprise (Y₅). The variable land under bamboo(X₉) has also been exerted the highest indirect effect and the variable family size(X₃) has rooted highest indirect effect of all the variables to ultimately functionalize the performance of Wage generation from Bamboo enterprise (Y₅).

Factor Analysis:

Factor-1 has accommodated the following variables: Family size (X₃).Land under agricultural crop (X₇).Area under bamboo(X₉), Energy consumption (X₁₆), Mode of selling(X₁₉) and this factor can be renamed as **Family Resource entrepreneurship**. This has contributed 15.96% of variance.**Factor-2** has accommodated the following variables: Mass media

exposure (X_{12}), Number of rhizome planted (X_{13}), Number of rhizome grew to the fullest(X_{14}) and this factor can be renamed as **Input Media Interaction**. This has contributed 12.761% of variance.**Factor-3** has accommodated the following variables: Age (X_1), Education (X_2), Homestead land (X_6) and this factor can be renamed as **Home and Human Resource Support**. This has contributed 11.017% of variance.**Factor-4** has accommodated the following variables: Material possessed(X_{10}), Annual income before bamboo (X_{11}) and this factor can be renamed as **Resource Status**. This has contributed 4.86% of variance.**Factor-8** has accommodated the following variables: Average cost of farm implements when purchased(X_4), Mode of selling(X_{19}) and this factor can be renamed as **Input Enterprise**. This has contributed 7.541% of variance. Since the rest of the factor have accommodated solitary variable in each of the cases, no renaming is required.

Canonical Correlation Analysis:

From the cross loading of the canonical covariates, it can be inferred that, while the entire Y set of variable are in interactive relationship, the two left side variables i.e. Family income from bamboo enterprise(Y_1) and Productivity of bamboo(Y_3) have respondent and dovetailed following X set of variable.

So, it can be concluded that the increase of income through increase of productivity needs a collective support from the causal variable like Age(X_1), Family size (X_3), Average cost of farm implements when purchased (X_4), Average cost of farm implements at present(X_5), Land under bamboo (X_9), Mass media exposure(X_{12}), Number of rhizome planted(X_{13}), Number of rhizome grown to the fullest (X_{14}), Training received(X_{15}), Cost incurred in bamboo cultivation(X_{18}). So the left set of variable (Y_1 & Y_3) combinedly can be branded as **Productive Economy Of Bamboo Enterprise** with a clandestine support from

Resource-Investment Factor.

In case of Set-II From the cross loading of the canonical covariates, it can be inferred that, while the entire Y set of variable are in interactive relationship, the three left side variables i.e. Family income from agricultural enterprise (Y₂), Mandays generated from bamboo enterprise(Y₄) and Wages generated from bamboo enterprise(Y₅) have respondent and dovetailed following X set of variable.

So, it can be concluded that the increase of income through increase of productivity needs a collective support from the causal variable like Education(X₂), Homestead land (X₆), Land under agricultural crop (X₇), Cropping intensity(X₈), Material possessed (X₁₀), Annual income before bamboo(X₁₁), Energy consumption(X₁₆), Distance to market (X₁₇), Mode of selling(X₁₉). So the left set of variable (Y₂, Y₄ & Y₅) combinedly can be branded as ***Farm Family Economy*** with a clandestine support from right side variable which also can be branded combinedly as ***Management – Communication Variable***.

7.2 CONCLUSION

Bamboo as an enterprise is flourishing comprehensively and robustly in the economy of Tripura. Huge pile of rural livelihood is generating there from and a belligerent entrepreneurship has been resulted there with. Beyond its elegant entrepreneurship, bamboo has got, as a unique plant type, the property to amply with the brunt of climate change. As an economic plantation crop it ushers the prospect of rural livelihood and dynamics of entrepreneurship. The present study includes the three basic aspects of Income, Productivity and Livelihood to develop a model and elucidate it further for judging and estimating as to where and how these three properties are being combined and interacting with each other. The canonical covariate analysis has rightly steered the direction wherein the set of dependent variable, while interacting with each other, has hooked up some few independent from the right set of variables. This will probably and perhaps provide a strategic configuration and operational suitability to usher up the propagation of bamboo enterprise across the state. The real challenges to the extension management and planning on bamboo enterprise

are that – how to increase the productivity of bamboo while income and livelihood will remain optimally operational and this way the other dependent variables can also be matched both functionally and structurally, against the independent variable. Of course it is also undeniable that the role of resource factors like size of holding, the count of rhizome and the land under bamboo enterprise have got a decisive impact on the economic aspect of bamboo simply to conclude that resource and management variable are the most important estimator of the economic and social performance of bamboo enterprise.

7.3 FUTURE SCOPE OF RESEARCH

This chapter deals with the scope of research which can be conducted on the basis of this research. Considering the nature and result obtained from it, many researches can be conducted in this direction :

- Similar type of study may be conducted in the other part of the state covering broad area.
- So, other researcher may carry out this study critically to generalize the findings.
- This kind of approaches can be applied to the other researches centering around the problem of strategic, research and extension (SRE), allocation of resources for important component in a management ambit based on their proportionate contribution to the productive performance.

7.4 LIMITATION OF THE STUDY

No research work is possible in this world which can go without limitation. This is also true for this study

- I. Excess of homogeneity among the bamboo growers of the locale of the study.
- J. The respondents are not equally responsive against the questions being asked. Thus it has hampered the in acquiring concrete data from some respondents.
- K. Resource rich information could not be collected as majority of the respondents are new in the arena of bamboo plantation.

L. More time should have been devoted to generate robust information.

7.5 RECOMMENDATION

The study comes up with the following recommendations

- I. Micro level strategy needs to be delineated to respond to the micro level requirements and possibilities as has been elicited by the study.
- J. Women empowerment through bamboo enterprise can be a proper intervention to institutionalize the gender issues through this enterprise.
- K. The impact and function of bamboo mission can be estimated through participatory evaluation process as embedded with PRA tools and technique.
- L. A technological gap has been identified with the count and function of rhizome, which have not been reflected through yield behavior.
- M. The present research should be replicated throughout the state in a research project form to help and support the functioning of bamboo mission in a more empirical and successful manner.