Estimating the correlates of employment and income generation through bamboo enterprise in Tripura

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ABSTRACT

A study was carried out to assess the correlates of employment and income generation through bamboo enterprise in Tripura. Here, 96 respondents were selected randomly from the Hezamara block of Tripura; total numbers of predictor variables were 19. The study revealed that the predictor variables namely family size, land under agricultural crop, land under bamboo, annual income before bamboo, energy consumption, cost incurred in bamboo cultivation had recorded significant association with employment and wage generation from bamboo enterprise. The variables like age, family size, land under agricultural crop, cropping intensity, land under bamboo, material possessed, energy consumption, cost incurred in bamboo cultivation, had been retained in the step down regression to imply that these variables were extremely important to these causal variables to interpret the reason and spectrum of variance of the consequent variable in its behavior and performance. It has been found that the variable family size has exerted the highest direct effect and routed highest indirect effect, the variable land under bamboo has been exerted the highest indirect effect, to characterize the man-days and wages generation from bamboo enterprise. 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. man-days generated from bamboo enterprise and wages generated from bamboo enterprise have respondent and dovetailed some of the X set of variable.

Bamboo has been a familiar natural resource to the local communities over the millenniums with 1500 documented applications. Known, as *venu* in Sanskrit, it was used for construction of *yajna shalas* (prayer shelter for religious rituals) and consecration of saintly persons in *vedic* era (circa 1000 BC). It has been often been referred to as a "poor man's timber", due to its ubiquitous distribution and ease of working with the simplest of tools, and this diminished the attention of the planners and resource managers (Anitha *et al.*, 2012). However, with the disquieting loss of forest cover and overall environmental degradation, it has again emerged as a panacea for wood substitution and promoting ecological and environmental security. The bamboo industry with immense economic potential in a labour surplus Indian economy has an important role in both the traditional and non-traditional sectors (Anitha and Sajayan, 2011) In Tripura, bamboo has many domestic, agricultural and commercial uses and cultural linkage with the bamboo dependent and indigenous people. The artisans in this sector make bamboo products for their sustenance and they are endowed only with traditional skills, tools and work experience (Anon., 2010).Their bamboo based productive activities mainly involve the four stages of procurement, processing, production and marketing. The raw material requirement of the bamboo

dependents is mainly sourced from natural areas/forest depots, private depots, local market and home gardens.

The experiment was carried with the objectives to assess the productive performance of bamboo enterprise in terms of livelihood, to assess the agro-economic, socio-personal and management characteristics of respondents as the causal variables, to assess and evaluate the relation between the causal and consequent variables both at inter and intra level and to derive some strategies for micro level interventions.

MATERIALS AND METHODS

The present study was conducted at Hezamara block of West district (Tripura). The district, block and village were selected purposively due to the availability of the bamboo entrepreneurs in this area. The purposive as well as simple random sampling techniques were adopted for the present study. It may be termed as multistage and random sampling procedure. The districts, blocks and villages were purposively selected for the study. The West district and the block Hezamara were considered. Under the Hezamara block Sharat chowdhury para village was selected. From Sharat Chowdhury Para village 96 bamboo growers had been selected out of 1500 bamboo growers following simple random

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sampling(list sampling and class interval). Various dependent and independent variables namely age (X1), education (X2), family size (X3), average cost of farm implements when purchased (X4), average cost of farm implements at present (X5), homestead land (X6), land under agricultural crop (X7), cropping intensity (X8), land under bamboo (X9), material possessed (X10), annual income before bamboo (X11), mass media exposure (X12), number of rhizome planted (X13), number of rhizome grown to the fullest (X14), training received (X15), energy consumption (X16), distance to market (X17), cost incurred in bamboo cultivation (X18), Mode of selling (X19), man-days generated in bamboo enterprise (Y1),Wages generated in bamboo enterprise (Y2) were selected in the present study. Livelihood generated from bamboo enterprise is measured by per year wages and mandays generated from bamboo enterprise.

The primary data in the present study were collected directly from the farmers with the help of structured schedule through personal interview methods. Only the functional head of the household were taken as respondents for the study. The personal interview method was followed during the month of May and October 2013 to collect the relevant information from targeted respondents. Statistical Package for the Social Sciences (SPSS) had been used for the analysis of the data.

RESULTS AND DISCUSSION

Correlation between the man-days generation from bamboo enterprise and other independent variables

The variable family size (X3) have been found negatively but significantly correlated to imply that man-days generated from bamboo enterprise (Y1) has gone higher for a small size family. Small size family has got relatively less family cost to incur and hence higher level of savings and surplus. X3 has recorded highest significant association. Land under agricultural crop (X7) and land under bamboo (X9) , on the other hand, have recorded a positive but significant correlation to imply that all type of lands are providing the resource support for the optimum farm operation and the generation of farm income. The size of land acts in the form of a volume of operational resources and hence can ensure better income and absorb any kind of risk. Annual income before bamboo (X11) has been found to have positive but significant correlation with man-days generated from bamboo enterprise (Y1). This is to imply that it has got congenital impact.

Energy consumption (X16) has been emerged as an important economic indicator to estimate the income from man-days generated from bamboo enterprise (Y1) of the respondents. This implies that the mechanization *vis-a-vis* energy intensification has gone positively to generate higher per unit man-days generation from bamboo enterprise. Cost incurred in bamboo cultivation (X18) has recorded to have positive but significant correlation with man-days generated from bamboo enterprise (Y1). This implies that respondents those who have invested high amount in bamboo plantation got higher income as well as higher man-days generated thereafter.

Correlation between wage generation from bamboo enterprise and other independent variables

The variable family size (X3) have been found negatively but significantly correlated to imply that wages generated from bamboo enterprise (Y2) has gone higher for a small size family. Small size family has got relatively less family cost to incur and hence higher level of savings and surplus. X3 has recorded highest significant association. Land under agricultural crop (X7) and land under bamboo (X9) , on the other hand, have recorded a positive but significant correlation to imply that all type of lands are providing the resource support for the optimum farm operation and the generation of farm income. The size of land acts in the form of a volume of operational resources and hence can ensure better income and absorb any kind of risk. Annual income before bamboo (X11), have been found to have positive but significant correlation with wages generated from bamboo enterprise (Y2). This is to imply that it has got congenital impact. Energy consumption (X16) has been emerged as an important economic indicator to estimate the income from wages generated from bamboo enterprise (Y2) of the respondents. This implies that the mechanization vis-a-vis energy intensification has gone positively to generate higher per unit wages generation from bamboo enterprise. Cost incurred in bamboo cultivation(X18) has recorded to have positive but significant correlation with wages generated from bamboo enterprise (Y2). This implies that those respondents who have invested high amount in bamboo plantation got higher income as well as higher Wages also.

Paradigm of step down regression: causal effect of independent variables on man-days generated from bamboo enterprise (Y1), the consequent variable
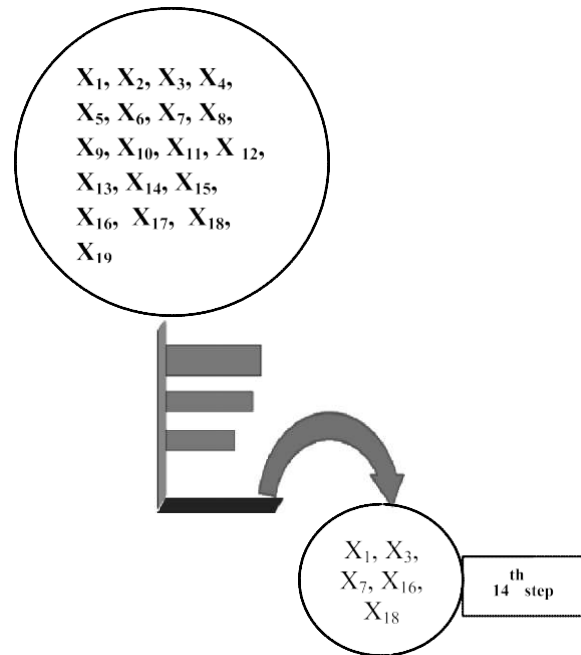
The step down regression analysis imply that, which are the few variable out of the whole plethora of

variables have been retained at the last step (13th) to contribute substantially on the consequent variable that is mandays generated from bamboo enterprise. So, Family size (X3), Land under agricultural crop(X7),Cropping intensity(X8), Material possessed(X10), Energy consumption(X16), Cost incurred in bamboo cultivation(X18)are the 6 most important causal variable to interpret the variance embedded with the mandays generated from bamboo enterprise.
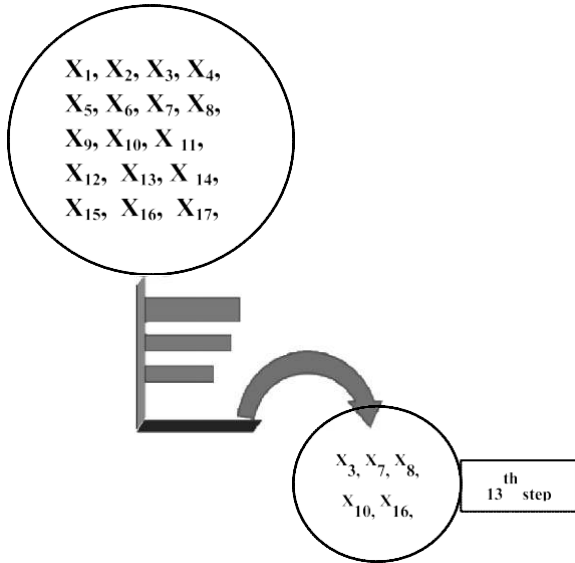

The variables retained at the last and 13th step

Paradigm of step down regression: causal effect of independent variables on wages generated from bamboo enterprise (Y2), the consequent variable.

The variables retained at the last and 14th step

The step down regression analysis to imply that, which are the few variables out of the whole plethora of variables have been retained at the last step (14th) to contribute substantially on the consequent variable that is Wages generated from bamboo enterprise. So, age (X1), family size (X3), land under agricultural crop (X7), energy consumption(X16), Cost incurred in bamboo cultivation(X18)are the 6 most important causal variable to interpret the variance embedded with the wages generated from bamboo enterprise.
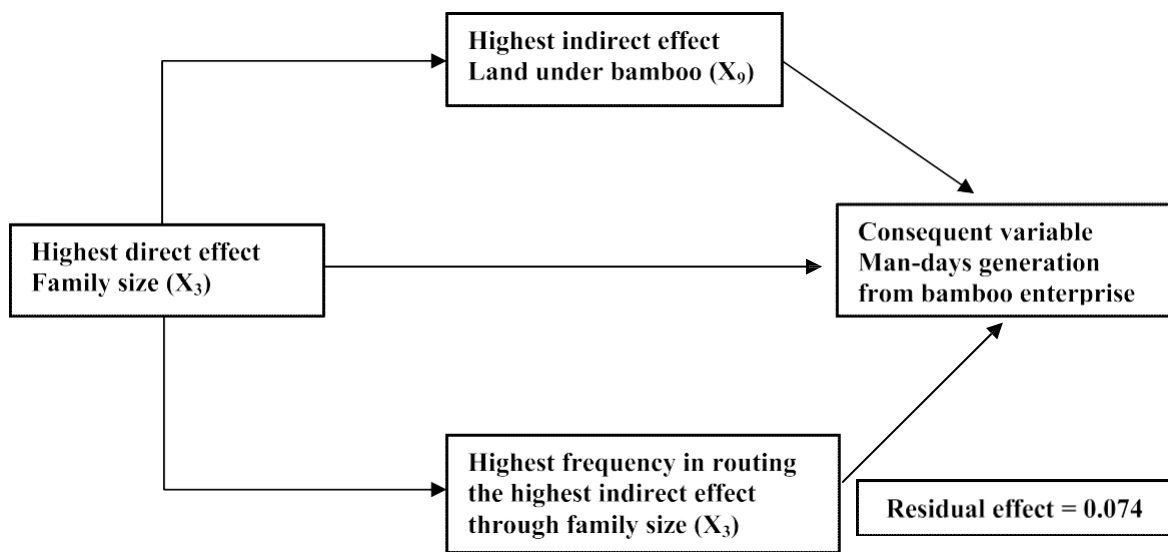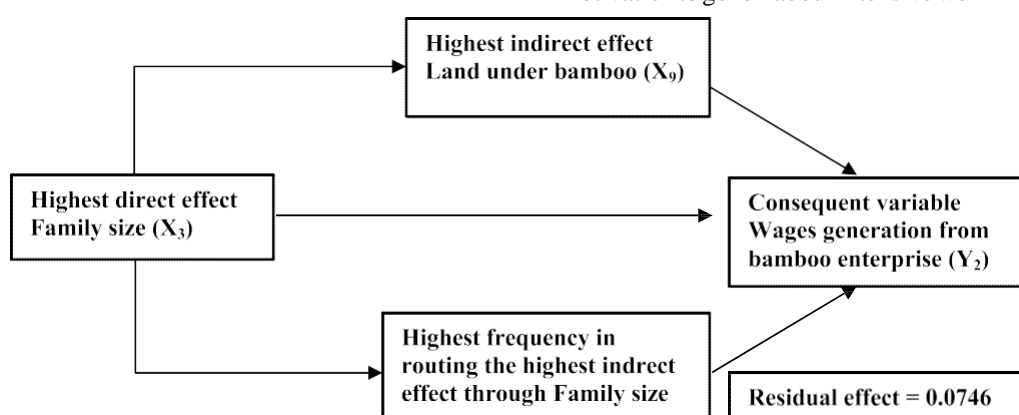

Path analysis: man-days generated from bamboo enterprise (Y₁) and other 19 exogenous variables

It has been found that the variable family size(X3) has exerted the highest direct effect to characterize the mandays generation from Bamboo enterprise. It is well discernible that family size presents both stress and motivation to go for labour intensive work in individual to elicit a better choice out of basket of commodity to support the family and earn better social status for the family.

The variable land under bamboo(X9) has also been exerted the highest indirect effect to imply that this variable has got highest associational property to characterize the mandays generation from of bamboo enterprise.

Again, it has been found that the variable family size(X3) has routed highest indirect effect of all the variables to ultimately functionalize the performance of mandays generation from bamboo enterprise. This indicates the behavioral as well as operational viscosity of this variable. The value of the residual effect indicates that with the combination of these 19 variables, more than 98 per cent variance of mandays generation from bamboo enterprise (Y1) has been explained.

It has been found that the variable family size(X3) has exerted the highest direct effect to characterize the wages generation from bamboo enterprise. It is well discernible that family size presents both stress and motivation to go for labour intensive work in individual


Path analysis: wages generated from bamboo enterprise (Y₂) and other 19 exogenous variables

to elicit a better choice out of basket of commodity to support the family and earn better social status for the family. The variable land under bamboo(X9) has also been exerted the highest indirect effect to imply that this variable has got highest associational property to characterize the wages generation from bamboo enterprise. Again, it has been found that the variable family size(X3) has routed highest indirect effect of all the variables to ultimately functionalize the performance of wage generation from bamboo enterprise. This indicates the behavioral as well as operational viscosity of this variable. The value of the residual effect indicates that with the combination of these 19 variables, more than 98 per cent variance of wages generation from (Y2) has been explained.

It presents the factor analysis to estimate the degree of conglomeration of apparently different exogenous variables, based on Eigen values into some discernible factor. It has been found that 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 (X12), number of rhizome planted (X13), number of rhizome grew to the fullest (X14). 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 (X1), education (X2), homestead land (X6). 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 (X10), annual income before bamboo (X11). 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 (X4), Mode of selling (X19). 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.

The cumulative variance is 87% which is fairly enough to explain any kind of interpretative variation as well as interaction amongst and between the whole plethora of variable including both dependent and independent variables.
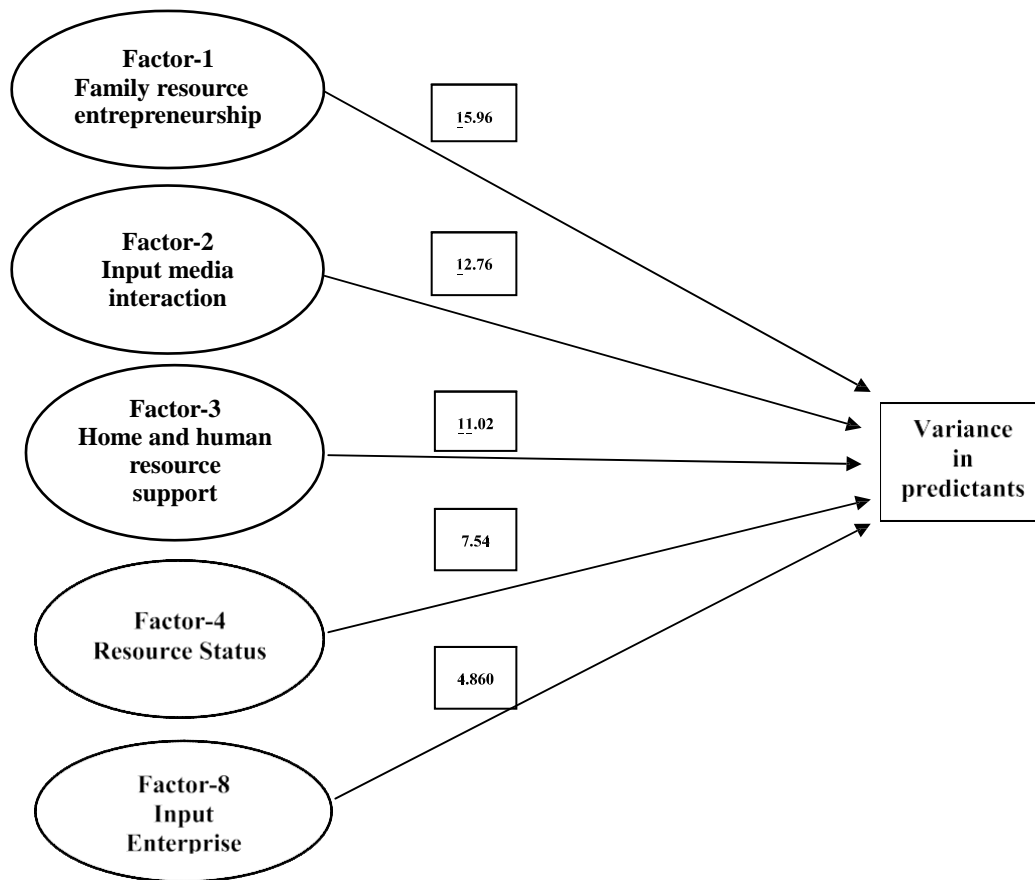
Factor analysis: conglomeration of variables based on factor loading and renaming of factors

Canonical covariate analysis has been carried out to depict the clandestine interactive and combination between two sets of variables i.e., left and right side sets of variables. This analysis has got tremendous strategic importance.

The model depicts that from the left side (Set-I) the following consequent variables *viz.* Y1= Family income from bamboo enterprise,Y3= Productivity of bamboo, have got clear choices to select the following exogenous variable *i.e.* from right set of variables *viz.* X1=Age, X3 =Family size, X4= Average cost of farm implements when purchased, X5= Average cost of farm implements at present,X9= Land under bamboo, X12= Mass media exposure, X13= Number of rhizome planted,X14= Number of rhizome grown to the fullest, X15= Training received, X18 = Cost incurred in bamboo cultivation.

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(Y1) and Productivity of bamboo(Y3) have respondent and dovetailed these 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 (X1), Family size (X3), Average cost of farm implements when purchased (X4)

Average cost of farm implements at present(X5), Land under bamboo (X9), Mass media exposure(X12), Number of rhizome planted(X13), Number of rhizome grown to the fullest (X14), Training received(X15), Cost incurred in bamboo cultivation(X18). So the left set of variable (Y1 & Y3) combined can be branded as *Productive Economy of Bamboo Enterprise* with a clandestine support from *Resource-Investment Factor.*
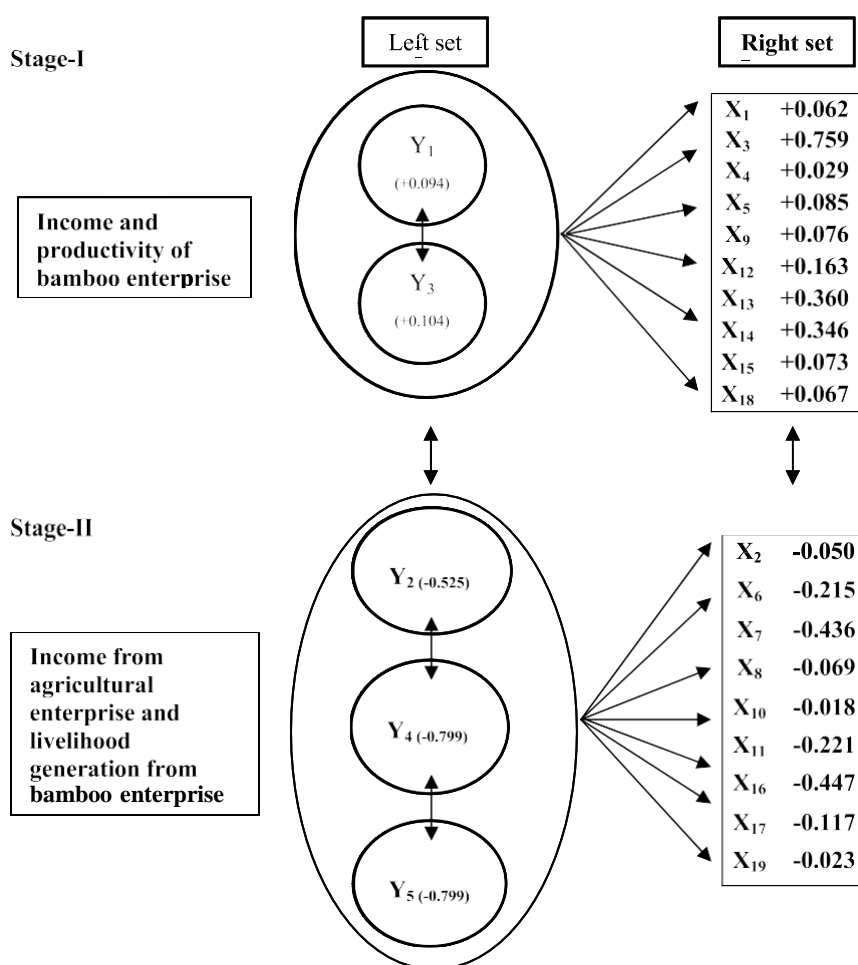
In case of Set-II From the cross loading of the canonical covariates, it can be inferred that, while the entire Y set of variable are in interactive relationship, the three left side variables i.e. family income from agricultural enterprise (Y2), mandays generated from bamboo enterprise (Y4) and wages generated from bamboo enterprise (Y5) have respondent and dovetailed these X set of variable.

So, it can be concluded that the increase of income through increase of productivity needs a collective

Stage-I

Left set

Right set

Y₁
(+0.094)

Income and productivity of bamboo enterprise

Y₃
(+0.104)

X₁	+0.062
X₃	+0.759
X₄	+0.029
X₅	+0.085
X₉	+0.076
X₁₂	+0.163
X₁₃	+0.360
X₁₄	+0.346
X₁₅	+0.073
X₁₈	+0.067

Stage-II

Y₂ (-0.525)

Income from agricultural enterprise and livelihood generation from bamboo enterprise

Y₄ (-0.799)

Y₅ (-0.799)

X₂	-0.050
X₆	-0.215
X₇	-0.436
X₈	-0.069
X₁₀	-0.018
X₁₁	-0.221
X₁₆	-0.447
X₁₇	-0.117
X₁₉	-0.023

Canonical correlation analysis

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) in combination can be branded as *Farm Family Economy* with a clandestine support from right side variable which also can be branded combined as *Management –Communication Variable.*

Livelihood generation is a complex process that undergoes a plethora of socio-economic and techno-ecological functions. In studding the livelihood generation from bamboo enterprises, the variables contributed to it are institutional and managerial in nature, consisting of family size, land resources, cropping intensity, cost and energy consumption. This multidimensional interaction means and implies that livelihood planning needs to consider not only the enterprise it deals with but also the ecology it confronts with. A constructive livelihood process whatsoever basically keeps integrating resource- time

- cost and technology while a coercive livelihood keeps depleting the resource base and creates a discord with the surrounding ecosystem. The same research can be cloned in different ecological and social set up in as much to develop a model based on bamboo enterprise towards prescribing a sustainable livelihood generation process.

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