CHAPTER - VI

FUNCTIONAL MODELLING OF VARIABLES FOR AN EMPIRICAL INVESTIGATION OF A MECHANISM OF INCOME GENERATION AND INTERPRETATION OF STRUCTURAL RELATIONS

6.0 In this chapter an attempt has been made to estimate the relevant structural equations and to interpret the co-efficients associated with different explanatory variables in the broad framework of income generation mechanism in various sectors of sericulture and silk industry. Structural equations explaining several policy variables are obtained from regression analysis using least squares method.

6.1 GRAINAGE SECTOR

The structural equation has been prepared on both annual and bund basis. The nomenclature to be used is as follows:

Y_1: Annual income of grainage (in Rs.).

Y_2: Annual production of DFLs (in No's).

Y_3: Annual output of DFLs (in Rs.) (Value of production plus value of cocoon waste).

X_1: Annual cost of seed cocoon (in Rs.).

X_2: Annual transport cost for the purchase of seed cocoon (in Rs.).

X_3: Annual cost for testing of the seed cocoon (in Rs.).

X_4: Annual expenditure on hired labour (in Rs.).

X_5: Annual expenditure on self employed labour (in Rs.).

X_6: Annual expenditure on disinfectants for washing of rooms (in Rs.).

X_7: Annual expenditure on disinfectants for washing of tools (in Rs.).

X_8: Fixed Capital (in Rs.).

X_9: Percentage of Bivoltine seed cocoon used.

X_{10}: Amount of bad debts (in Rs.).

YC_1: Income of grainage in Chaitra bund (in Rs.).

YC_2: Production of DFLs (in No's) in Chaitra bund.

YC_3: Output of DFLs in Chaitra bund (in Rs.).

XC_1: Cost of seed cocoon in Chaitra bund (in Rs.).

XC_2: Transport cost for the purchase of seed cocoon in Chaitra bund (in Rs.).

XC_3: Cost for testing of the seed cocoon in Chaitra bund (in Rs.).

XC_4: Expenditure on hired labour in Chaitra bund (in Rs.).

XC_5: Expenditure on self employed labour in Chaitra bund (in Rs.).

XC_6: expenditure on disinfectants for washing of rooms in Chaitra bund(in Rs.).

XC_7: Cost of disinfectants of tools in Chaitra bund (in Rs.).

XC_8: Fixed capital (in Rs.).

XC_9: Percentage of Bivoltine seed cocoon used in Chaitra bund (in Rs.).

XC_{10}: Amount of bad debts in Chaitra bund (in Rs.).

YB_1: Income of grainage in Baishakhi bund (in Rs.).

YB_2: Production of DFLs (in No's) in Baishakhi bund (in Rs.).

YB_3: Output of DFLs in Baishakhi bund (in Rs.).

XB_1: Cost of seed cocoon in Baishakhi bund (in Rs.).

XB_2: Transport cost for the purchase of seed cocoon in Baishakhi bund (in Rs.).

XB_3: Cost for testing of the seed cocoon in Baishakhi Bund (in Rs.).

XB_4: Expenditure on hired labour in Baishakhi bund (in Rs.).

XB_5: Expenditure on self employed labour in Baishakhi bund (in Rs.).

XB_6: Expenditure on disinfectants for washing of room in Baishakhi bund (in Rs.).

XB_7: Cost on disinfectants for washing of tools in Baishakhi bund (in Rs.).

XB_8: Fixed capital (in Rs.).

XB_9: Percentage of Bivoltine seed cocoon used in Baishakhi bund (in Rs.).

XB_{10}: Amount of bad debts in Baishakhi bund (in Rs.).

YS_1: Income of grainage in Srabani bund (in Rs.).

YS_2: Production of DFLs (in No's) in Srabani bund.

YS_3: Output of DFLs in Srabani bund (in Rs.).

XS_1: Cost of seed cocoon in Srabani bund (in Rs.).

XS_2: Transport cost for the purchase of seed cocoon in Srabani bund (in Rs.).

XS_3: Cost for testing of the seed cocoon in Srabani bund (in Rs.).

XS_4: Expenditure on hired labour in Srabani bund (in Rs.).

XS_5: Expenditure on self-employed labour in Srabani bund (in Rs.).

XS_6: Expenditure on disinfectants for washing of room in Srabani bund (in Rs.).

XS_7: Cost on disinfectants for washing of tools in Srabani bund (in Rs.).

XS_8: Fixed capital (in Rs.).

XS_9: Percentage of Bivoltine seed cocoon used in Srabani bund (in Rs.).

XS_{10}: Amount of bad debts in Srabani bund (in Rs.).

YV_1: Income of grainage in Bhaduri bund (in Rs.).

YV_2: Production of DFLs (in No's) in Bhaduri bund.

YV_3: Output of DFLs in Bhaduri bund (in Rs.).

XV_1: Cost of seed cocoon in Bhaduri bund (in Rs.).

XV_2: Transport cost for the purchase of seed cocoon (in Rs.).

XV_3: Cost for testing of the seed cocoon in Bhaduri bund (in Rs.).

XV_4: Expenditure on hired labour in Bhaduri bund (in Rs.).

XV_5: Expenditure on self employed labour in Bhaduri bund (in Rs.).

XV_6: Expenditure on disinfectants for washing of room in Bhaduri bund (in Rs.).

XV_7: Cost on disinfectants for washing of tools in Bhaduri bund (in Rs.).

XV_8: Fixed capital (in Rs.).

XV_9: Percentage of Bivoltine seed cocoon used in Bhaduri bund (in Rs.).

XV_{10}: Amount of bad debts in Bhaduri bund (in Rs.).

YA_1: Income of grainage in Aghrani bund (in Rs.).

YA_2: Production of DFLs (in No's) in Aghrani bund.

YA_3: Output of DFLs in Aghrani bund (in Rs.).

XA_1: Cost of seed cocoon in Aghrani bund (in Rs.).

XA_2: Transport cost for the purchase of seed cocoon in Aghrani bund (in Rs.).

XA_3: Cost for the testing of the seed cocoon in Aghrani bund (in Rs.).

XA_4: Expenditure on hired labour in Aghrani bund (in Rs.).

XA_5: Expenditure on self employed labour in Aghrani bund (in Rs.).

XA_6: Expenditure on disinfectants for washing of room in Aghrani bund(in Rs.).

XA_7: Cost on disinfectants for washing of tools in Aghrani bund (in Rs.).

XA_8: Fixed capital (in Rs.).

XA_9: Percentage of Bivoltine seed cocoon used in Aghrani bund (in Rs.).

XA_{10}: Amount of bad debts in Aghrani bund (in Rs.).

The Interpretation of the structural relationship obtained from regression analysis is as follows:

6.1.1 Income of The Grainage (In Rs.) : Structural Relations

i) Annual income (in Rs.) of the grainage

Annual income has been regressed on annual cost of seed cocoon (X_1), annual expenditure on disinfectants for washing of room (X_6) and amount of bad debts (X_{10}). Y_1 was first regressed on other variables like X_2, X_3, X_4, X_5, X_7, X_8 and X_9. But no significant influences of said variables on Y_1 were found; therefore these variables are excluded from the regression equation. The regression equation so fitted is:

$$Y_1 = 238.72 + .502\overset{*}{X_1} - 10.960\overset{**}{X_6} - 0.797\overset{**}{X_{10}} \qquad :R^2 = .\overset{*}{59}$$
$$(7697.10) \quad (0.084) \quad (3.985) \quad (.309)$$

The R^2 of this equation is as moderate as .59, which depicts that the variables here provide a moderate fit for the relevant dependent variable. The marginal contribution of X_1, X_6 and X_{10} on Y_1 keeping other variables fixed are 0.502, -10.960, -0.797 respectively. Good quality of seed cocoon (X_1) has a positive impact on income in this sector whereas use of medicine (X_6) Cost of seed cocoon (X_1) has a positive impact on income in this sector whereas use of medicine (X_6) has negative influences on income. Producers usually do not make a judicious use of disinfectants, there by having an adverse impact on total production.

ii) Income (in Rs.) of the grainage in Chaitra bund

Income of the grainage in Chaitra bund (YC_1) has been regressed on expenditure on self-employed labour (XC_5), cost of seed cocoon (XC_1), fixed capital (XC_8), transport cost incurred for seed cocoon (XC_2) and amount of bad debts (XC_{10}). YC_1 was regressed with other variables, XC_3, XC_4, XC_6 and XC_7 but no significant influence of these said variables on YC_1 were found, and therefore these variables are excluded from the regression equation. For the Chaitra bund the regression equation so estimated is:

$$YC_1 = -1279.0 - 10.390\overset{*}{XC_2} + 4.680\overset{**}{XC_5} + .282\overset{**}{XC_8} + 1.858\overset{*}{XC_{10}} \qquad : R^2 = \overset{*}{.67}$$
$$(4675.7) \quad (2.681) \qquad (2.531) \qquad (.126) \qquad (.481)$$

The R^2 value in this equation is moderately high and speaks of the efficiency of the right hand side variables together in explaining the variation in the income of the grainage sector.

The marginal contribution of XC_2, XC_5, XC_8, XC_{10} on YC_1 keeping other variables fixed are -10.390, 4.680, .282, 1.858 respectively. The explained variation by above regression is 67% of the total variation of YC_1. The variables XC_5, XC_8 and XC_{10} have a positive influence on YC_1, which signifies that extra transport cost is not for the quality products but it signifies non-availability of the seed cocoon in nearby markets.

iii) Income (in Rs.) of the grainage sector in Baishakhi bund

For Baishakhi bund YB_1 was regressed on all the variables i.e. XB_1------XB_{10}. But no significant influence of the said variables were found besides, calculated R^2 value was also very low which depicts that the explanatory variable are incapable of explaining variation in concerned dependent variable in this bund. No model can be fitted for the said season. In fact due to excessive moist condition the production is usually very low and most of the time even the total crop is lost. Thus production does not bear any relation to the variables, which usually contribute towards production, and is highly erratic.

iv) Income (in Rs.) of the grainage sector in Srabani bund

Income of the grainage in Srabani bund (YS_1) has been regressed on hired labour used (XS_4) and transport cost of seed cocoon purchased (XS_2). For the said season the regression equation so estimated is:

$$YS_1 = 1661.2 - 1.843\overset{*}{XS_2} + 3.112\overset{*}{XS_4} \qquad : R^2 = \overset{*}{.69}$$
$$(475.85) \quad (.434) \qquad (.661)$$

The R^2 value of this equation is moderately high as .69, which depicts that the explanatory variables are capable of explaining variation in concerned dependent variable in the said season.

The marginal contribution of XS_2 and XS_4 on YS_1 keeping other variables fixed are -1.843 and 3.112 respectively. The explained variation by the above regression is 69% of the total variation of YS_1. The variable XS_4 has a positive influence on YS_1 whereas XS_2 has a negative influence on YS_1. The negative impact of XS_2 signifies non-availability of the seed cocoon in nearby markets.

v) Income (in Rs.) of the grainage sector in Bhaduri bund

Income of the grainage sector in Bhaduri bund (YV_1) has been regressed on cost of seed cocoon (XV_1) and the amount of bad debts (XV_{10}). YV_1 was regressed also on other variables like XV_2, XV_3, XV_4, XV_5, XV_6, XV_7, XV_8 and XV_9. But no significant influences of said variables were found; therefore, these variables were excluded from the regression equation. For the said bund the regression equation so estimated is:

$$YV_1 = \underset{(1115.3)}{1655.1} + \underset{(.106)}{.626}\overset{*}{X}V_1 - \underset{(.426)}{1.395}\overset{**}{X}V_{10} \qquad : R^2 = .6\overset{*}{3}$$

The R^2 value of this equation is moderately high i.e. 0.63 which depicts that the variables have provided a good fit for the relevant dependent variables.

The marginal contribution of XV_1 and XV_{10} on YV_1 keeping other variables fixed are .626 and -1.395 respectively. The explained variation by the above regression is 63% of the total variation of the YV_1. The variable XV_1 has the positive influence on YV_1 and XV_{10} has a negative influence on YV_1. It is noted that excessive rainfall throughout this season affects the production of green cocoon adversely and rearers in most cases are not in a position to pay the debts taken for the purchase of DFLs from grainage. Hence bad debts have negative influence on the total production.

vi) Income (in Rs.) of the grainage in Aghrani bund

Income of the grainage in Aghrani bund (YA_1) has been regressed on the hired labour cost (XA_4) and amount of bad debts (XA_{10}). YA_1 was regressed on other variables

(XA_1, XA_2, XA_3, XA_5, XA_6, XA_7, XA_8 and XA_9) but no significant influences of these said variables on YA_1 were found. Therefore these variables are excluded from the regression equation. For the Aghrani season the regression equation so estimated is:

$$YA_1 = -1141.6 - 1.461\overset{*}{XA_4} + .893\overset{*}{XA_{10}} \qquad : R^2 = .9\overset{*}{5}$$
$$(955.08) \quad (.162) \qquad (.044)$$

The R^2 value .95 of this equation is very high which depicts that the variables have provided a good fit for the relevant dependent variable.

The marginal contributions of XA_4 and XA_{10} on YA_1 keeping other variables fixed are -1.461 and .893 respectively. The explained variation by the above regression is 95% of the total variation of YA_1. The variable XA_{10} has a positive influence on YA_1 whereas XA_4 has a negative influence on YA_1.

It can be noted that majority of the grainage sector produce Bivoltine DFLs in this bund and they sell their produce at a high price. So the profit margin is very high. Thus even if part of the sale of output is in the form of advance, variable XA_{10} has a positive influence as it ensures profit. Impact of XA_4 is negative on YA_1 which signify that hired labours do not make a conscious effort to work properly. Hence it results in a low productivity in Bivoltine DFLs production.

6.1.2 Production of Dfls (No's) In Grainage Sector: Structural Relations

i) Annual production of DFLs (NO'S) in grainage sector

Annual production of DFLs (No's) Y_2 has been regressed on cost of seed cocoon (X_1), transport cost on seed cocoon (X_2), expenditure on self-labour (X_5) and cost on disinfectants for cleaning the room with medicine (X_6). Y_2 was also regressed on other variables (X_3, X_4, X_7, X_8, X_9 and X_{10}) but no significant influences of these said variables on Y_2 were found; hence, these variables are excluded from the regression equation. Regression equation so estimated for the annual case is:

$$Y_2 = 22254 + 3.086\overset{*}{X_1} - 11.050\overset{*}{X_2} + 5.967\overset{**}{X_5} - 9.9137\overset{**}{X_6} \qquad : R^2 = .\overset{*}{8}2$$
$$(102.00) \quad (.282) \quad (2.200) \quad (2.469) \quad (5.00)$$

The R^2 value in this equation is high and speaks of the efficiency of the right hand side variables together in explaining the variation in the annual production of DFLs.

The marginal contribution of X_1, X_2, X_5, X_6 on Y_2 keeping other variable fixed are 3.086, -11.050, 5.967, -9.914 respectively. The explained variation by the above regression is 82% of the total variation in Y_2. The variables X_1 and X_5 have a positive influence on Y_2 whereas, X_2 and X_6 have a negative influence on Y_2.

While explaining the role of individual explanatory variables, it is observed that X_2 is related negatively with production because increase in X_2 is related to the increase in F_1 type of seed and the total production of Bivoltine DFLs will be less in quantity.

ii) Production of DFLs (NO'S) in Chaitra bund

Production of DFLs (No's) in Chaitra bund (YC_2) has been regressed on cost of seed cocoon (XC_1), cost on self-employed labour (XC_5) and % of Bivoltine seed cocoon used (XC_9). YC_2 was regressed on other variables like (XC_2, XC_3, XC_4, XC_6, XC_7, XC_8 and XC_{10}), but no significant influence of these variables on YC_2 was found. Therefore these variables are excluded from the regression equation. For the Chaitra bund the regression equation so estimated is:

$$YC_2 = \underset{(5612.6)}{1531.1} + \underset{(.149)}{1.728}\overset{*}{XC_1} + \underset{(3.153)}{15.608}\overset{*}{XC_5} - \underset{(233.49)}{621.56}\overset{**}{XC_9} \qquad : R^2 = .89^{*}$$

The R^2 value is high i.e. .89 which depicts that the variables have provided a good fit for the relevant dependent variables.

The marginal contribution of XC_1, XC_5 and XC_9 on YC_2 keeping other variables fixed are 1.728, 15.608, and -621.56 respectively. The explained variation by the above regression is 89% of the total variation. The variable XC_1 and XC_5 have a positive influence on YC_2 whereas XC_9 has a negative influence on YC_2, because the output in number of Bivoltine type of DFLs will be always less compared to Nistari type.

iii) Production of DFLs (No's) in Baishakhi bund

Production of DFLs (No's) (YB_2) in Baishakhi bund has been regressed on cost of seed cocoon (XB_2), cost on hired labour (XB_4) and cost on disinfectants for cleaning of room (XB_6). YB_2 was also regressed on XB_2, XB_3, XB_5, XB_7, XB_8, XB_9 and XB_{10}. But no significant influence of these said variables on YB_2 were found. Therefore these variables are excluded from the regression equation. For the Baishakhi bund the regression equation so estimated is:

$$YB_2 = \underset{(2284.0)}{4903.5} + \underset{(.237)}{2.541}\overset{*}{XB_1} + \underset{(3.309)}{7.352}\overset{**}{XB_4} - \underset{(5.173)}{10.829}\overset{**}{XB_6} \qquad : R^2 = .86^{*}$$

The R^2 value for the regression equation is high i.e. .86 which indicates that the explanatory variables are capable of explaining variation in concerned dependent variables in the said industrial sector.

The marginal contribution of XB_1, XB_4 and XB_6 keeping other variables fixed are 2.541, 7.352 and -10.829 respectively. The explained variation by the above regression is 86% of the total variation of YB_2. The variable XB_1 and XB_4 have a positive influence on YB_2 whereas XB_6 has a negative influence on YB_2.

iv) Production of DFLs (No's) in Srabani bund

Production of DFLs in Srabani bund (YS_2) has been regressed on transport cost for the purchase of seed cocoon (XS_2), Self-employed labour cost (XS_5), cost on disinfectants for cleaning of room (XS_6) and Fixed Capital (XS_8). YS_2 was regressed on other variables like XS_1, XS_3, XS_4, XS_7 and XS_9 but no significant influence of these said variables on YS_2 were found. Therefore these variables are excluded from the regression equation. For the Srabani bund the regression equation so estimated is:

$$YS_2 = \underset{(538.4)}{1817.2} + \underset{(5.239)}{26.045}\overset{*}{XS_2} + \underset{(6.032)}{15.608}\overset{**}{XS_5} - \underset{(6.856)}{13.85}\overset{***}{XS_6} - \underset{(.107)}{.2216}\overset{***}{XS_8} \qquad : R^2 = .95^{*}$$

R^2 being very high in the above equation depicts that the variables have provided a good fit for the relevant dependent variable.

The marginal contribution of XS_2, XS_5, XS_6 and XS_8 on YS_2 keeping other variables fixed as a 26.045, 15.608, -13.85, and -.2216 respectively. The explained variation by the above regression is 95% of the total variation of YS_2. The variable XS_2 and XS_5 have a positive influence on YS_2 whereas XS_6 and XS_8 have a negative influence on YS_2.

It may be observed that pucca building is not suitable for production because temperature inside the room remains high. Kachha building made of mud wall with tali roof is more suitable. Thus low fixed capital assets will be more favourable for production.

v) Production of DFLs (No.'s) in Bhaduri bund

Production of DFLs in Bhaduri crop (YV_2) has been regressed on cost of seed cocoon (XV_1) only. Beside this YV_2 was regressed on other variable like XV_2, XV_3, XV_4, XV_5, XV_6, XV_7, XV_8, XV_9, and XV_{10}, but no significant influence of these said variables were found. Hence, these variables are excluded from the regression equation. For the Bhaduri bund the regression equation so estimated is:

$$YV_2 = \underset{(644.50)}{2863.3} + \underset{(.096)}{2.782}\, \overset{*}{X}V_1 \qquad : R^2 = .9\overset{*}{7}$$

R^2 for this equation is very high. The explained variation by the above regression is 97% of the total variation of YV_2 the variable XV_1 has a positive influence on YV_2

vi) Production of DFLs (No's) in Aghrani bund

The production of DFLs in No's in Aghrani bund (YA_2) has been regressed on cost of seed cocoon (XA_1) and percentage of Bivoltine seed cocoon (XA_9). YA_2 were regressed on other variables (XA_2, XA_3, XA_4, XA_5, XA_6, XA_7, XA_8 and XA_{10}) also, but, no significant influence of these said variables on YA_2 were found. Therefore these variables are calculated from the regression equation. For the Aghrani bund the regression equation so estimated is:

$$YA_2 = \underset{(1878.2)}{10296} + \underset{(.082)}{1.8128}\overset{*}{X}A_1 - \underset{(155.19)}{490.91}\overset{*}{X}A_9 \qquad : R^2 = .9\overset{*}{6}$$

R^2 value of this equation is as high as .96, which depicts that the variables have provided a good fit for the relevant dependent variable.

The marginal contributions of XA_1 and XA_9 on YA_2 keeping other variables fixed are 1.813 and -490.91. The explained variation by the above regression is 96% of the total variation of YA_2. The variable XA_1 has a positive influence on YA_2 whereas XA_9 has a negative influence on YA_2, because Bivoltine seed cocoon gives low production of DFLs in terms of quantity.

6.1.3. Output of Grainage (in Rs.) : Structural Relations

i) Annual output of grainage (in Rs.)

Annual output of grainage (Y_3) has been regressed on cost of seed cocoon used (X_1) and expenditure on disinfectants for washing of room with medicine (X_6). Y_3 was regressed on other variables i.e. X_2, X_3, X_4, X_5, X_7, X_8, X_9, and X_{10}, but no significant influence of the said variables on Y_3 were found. Therefore these variables are excluded from the regression equation. For the annual output the regression equation so estimated is:

$$Y_3 = \underset{(6784.6)}{20211.00} + \underset{(.072)}{1.827\overset{*}{X_1}} - \underset{(3.679)}{8.089\overset{**}{X_6}} \qquad : R^2 = .9\overset{*}{6}$$

R^2 being very high in this equation depicts that the variables have provided a good fit for the relevant dependent variable.

The marginal contribution of X_1 and X_6 on Y_3 keeping other variables fixed are 1.827 and -8.089. The explained variation by above regression is 96% of the total variation of Y_3. The variable X_1 has a positive influence on Y_3 whereas X_6 has a negative influence on Y_3.

ii) Output of grainages (in Rs.) in Chaitra bund

Output of grainage in Chaitra bund (YC_3) has been regressed on required seed cocoon (XC_1) and expenditure on self labour (XC_5). YC_3 was regressed on other variables (XC_2, XC_3, XC_4, XC_6, XC_7, XC_8, XC_9 and XC_{10}) but no significant influences of these variables on Y_3 were found. Therefore these variables are excluded from the regression equation. For the said bund the regression equation so estimated is:

$$YC_3 = \underset{(4922.1)}{8379.4} + \underset{(.160)}{1.825}\overset{*}{XC_1} + \underset{(3.751)}{14.688}\overset{*}{XC_5} \qquad : R^2 = .86^{*}$$

R^2 being sufficiently high in this equation indicates that the variables conclusively explain the dependent variable in conformity with the maintained hypothesis.

The marginal contribution of XC_1 and XC_5 on YC_3 keeping other variables fixed are 1.825 and 14.688. The explained variation by the above regression is 86% of the total variation of YC_3. The impact of the explanatory variables are positive but impact of XC_5 is more than XC_1.

iii) Output of grainage (in Rs.) in Baishakhi bund

Output of grainage in Baishakhi bund (YB_3) has been regressed on cost of seed cocoon (XB_1) and transport cost for seed cocoon purchased (XB_2). For the Baishakhi bund the regression equation so estimated is:

$$YB_3 = \underset{(3234.3)}{6156.1} + \underset{(.734)}{1.297}\overset{***}{XB_1} + \underset{(2.101)}{6.908}\overset{***}{XB_2} \qquad : R^2 = .26^{*}$$

The R^2 value is not sufficiently high, so the variables cannot explain the dependent variable in conformity with the maintained hypothesis.

The marginal contribution of XB_1 and XB_2 on YB_3 keeping other variable fixed are 1.297 and 6.908. The explained variation by the above regression is only 26% of the total variation. The variables XB_1 and XB_2 have a positive influence on YB_3.

iv) Output of grainage (in Rs.) in Srabani bund

Output of grainage in Srabani bund (YS_3) has been regressed on the cost of seed cocoon (XS_1), hired labour (XS_4) and self employed labour cost (XS_5). YS_3 was regressed on other variables i.e. XS_2, XS_3, XS_6, XS_7, XS_8, XS_9 and XS_{10}, but no significant influence of these variables on YS_3 were found. Therefore these variables are excluded from the regression equation. For the Srabani bund the regression equation so estimated is:

$$YS_3 = -2709.7 + 1.079\overset{*}{XS_1} + 5.448\overset{***}{XS_4} + 8.7937\overset{*}{XS_5} \qquad : R^2 = .97^{*}$$
$$(462.1) \quad (.122) \quad (3.101) \quad (1.557)$$

R^2 being very high in this equation depicts that the variables conclusively explain the dependent variable in conformity with the maintained hypothesis.

The marginal contribution of XS_1, XS_4 and XS_5 on YS_3 keeping other variables fixed are 1.079, 5.448, and 8.794 respectively. The explained variation by the above regression is 97% of the total variation of YS_3. The variables XS_1, XS_4, XS_5 have positive influence on YS_3 in conformity with the maintained hypothesis.

v) Output of grainage (in Rs.) in Bhaduri bund

The output of grainage sector in Bhaduri bund (YV_3) has been regressed on cost of seed cocoon (XV_1). YV_3 was regressed on other variables are XV_2, XV_3, XV_4, and XV_{10} but no significant influences of the said variables on YV_3 were found. Therefore these variables are excluded from this regression equation. For the Bhaduri bund the regression equation so estimated is:

$$YV_3 = 3346.2 + 1.582\overset{*}{XV_1} \qquad : R^2 = .96^{*}$$
$$(1140.0) \quad (.067)$$

R^2 value is very high which depicts that the variables have provided a good fit for the relevant dependent variable. The explained variation by the above regression is 96% of the total variation of YV_3. The variable XV_1 has a positive influence on YV_3 in conformity with the hypothesis.

vi) The output of grainage (in Rs.) in Aghrani bund

The output of grainage in Aghrani bund (YA_3) has been regressed on value of seed cocoon (XA_1), hired labour cost (XA_4), self-labour used (XA_5) and percentage of Bivoltine seed cocoon used (XA_9). YA_3 have regressed on other variables (XA_2, XA_3,

XA_6, XA_7, XA_8 and XA_{10}) also but no significant influences of these variables on YA_3 were found, therefore, these variables are excluded from the regression equation. For the Aghrani seasons the regression equation so estimated is:

$$YA_3 = 735.69 + 2.159XA_1^{*} - 2.642XA_4^{*} - 3.088XA_5^{*} + 194.42XA_9^{*} \qquad : R^2 = .97^{*}$$
$$(1173.9) \quad (.0489) \quad (-.9449) \quad (-.990) \quad (78.049)$$

R^2 being very high in this equation depicts that the variables conclusively explain the dependent variable inconformity with the maintained hypothesis.

The marginal contribution of XA_1, XA_4, XA_5 and XA_9 on YA_3 keeping other variables fixed are 2.159, -2.642, -3.088 and 194.42 respectively. The explained variation by the above regression equation is 97% of the total variation in YA_3. The variables XA_1 and XA_9 influence YA_3 positively as per hypothesis whereas impact of XA_4 and XA_5 is negative on YA_3.

Summary of Stepwise Linear Regression of Income,
Production and Output of Grainage Sector is as follows.

1. $$Y_1 = 23872 + .502X_1^{*} - 10.69X_6^{**} - .797X_{10}^{**} \qquad : R^2 = .59^{*}$$
$$(7697.1) \quad (.084) \quad (3.985) \quad (.308)$$

2. $$Y_2 = 22254 + 3.086X_1^{*} - 11.05X_2^{*} + 5.967X_5^{**} - 9.937X_6^{**} \qquad : R^2 = .82^{*}$$
$$(10215) \quad (.283) \quad (2.200) \quad (2.458) \quad (5.001)$$

3. $$Y_3 = 20211 + 1.827X_1^{*} - 8.089X_6^{**} \qquad : R^2 = .96^{*}$$
$$(6784) \quad (.072) \quad (3.680)$$

4. $$YC_1 = -12790 + 1.857XC_1^{*} - 10.390XC_2^{*} + 4.679XC_5^{***} + .282XC_8^{**} \qquad : R^2 = .67^{*}$$
$$(4675.7) \quad (.481) \quad (2.680) \quad (4.53) \quad (.126)$$

5. $$YC_2 = 1531.1 + 1.728XC_1^{*} + 15.60XC_5^{*} - 621.56XC_9^{**} \qquad : R^2 = .89^{*}$$
$$(5612.6) \quad (.149) \quad (3.153) \quad (233.49)$$

6. $YC_3 = 8379.4 + 1.825\overset{*}{X}C_1 + 14.688\overset{*}{X}C_5$: $R^2 = .8\overset{*}{7}$

$\quad (4922.1) \quad (.161) \quad (3.75)$

7. $YB_2 = 4903.5 + 2.541\overset{*}{X}B_1 + 7.352\overset{**}{X}B_4 - 10.829\overset{**}{X}B_6$: $R^2 = .8\overset{*}{6}$

$\quad (2284.0) \quad (.237) \quad (3.309) \quad (5.173)$

8. $YB_3 = 6156.1 + 1.297\overset{***}{X}B_1 + .691\overset{***}{X}B_2$: $R^2 = .2\overset{*}{6}$

$\quad (1900.5) \quad (.251) \quad (3.494)$

9. $YS_1 = 1661.2 - 1.843\overset{*}{X}S_2 + 3.112\overset{*}{X}S_4$: $R^2 = .6\overset{*}{9}$

$\quad (475.85) \quad (.433) \quad (.661)$

10. $YS_2 = 1817.2 + 26.045\overset{*}{X}S_2 + 15.608\overset{**}{X}S_5 - 13.850\overset{***}{X}S_6 - .222\overset{***}{X}S_8$: $R^2 = .9\overset{*}{5}$

$\quad (538.4) \quad (5.239) \quad (6.032) \quad (6.856) \quad (.107)$

11. $YS_3 = -2709.7 + 1.078\overset{*}{X}S_1 + 5.448\overset{***}{X}S_4 + 8.794\overset{*}{X}S_5$: $R^2 = .9\overset{*}{7}$

$\quad (1462.1) \quad (.122) \quad (3.101) \quad (1.557)$

12. $YV_1 = 1655.1 + .626\overset{*}{X}V_1 - 1.395\overset{*}{X}V_{10}$: $R^2 = .6\overset{*}{3}$

$\quad (115.3) \quad (.106) \quad (.426)$

13. $YV_2 = 2863.3 + 2.782\overset{*}{X}V_1$: $R^2 = .9\overset{*}{7}$

$\quad (1644.5) \quad (.096)$

14. $YV_3 = 3346.2 + 1.582\overset{*}{X}V_1$: $R^2 = .9\overset{*}{6}$

$\quad (1140.0) \quad (.066)$

15. $YA_1 = -1141.6 - 1.461\overset{*}{X}A_4 + .893\overset{*}{X}A_{10}$: $R^2 = .9\overset{*}{5}$

$\quad (955.08) \quad (.162) \quad (.044)$

16. $YA_2 = 10296 + 1.8128\overset{*}{X}A_1 - 490.91\overset{*}{X}A_9$: $R^2 = .9\overset{*}{6}$

$\quad (1878.2) \quad (.082) \quad (155.19)$

17. $YA_3 = 735.69 + 2.159\overset{*}{XA_1} - 2.642\overset{*}{XA_4} - 3.088\overset{*}{XA_5} + 194.42\overset{*}{XA_9}$ $\quad : R^2 = .97^*$

(1173.9) (.048) (.945) (.990) (78.049)

Figures in parenthesis are corresponding standard errors, and *, **, ***, indicate that the parameters are statistically significant at 1%, 5%, 10% level of significance respectively for (n-p-1) degrees of freedom. Where n represents the number of observations and p represents the number of explanatory variables.

Optimum functional models of Income, Production and output in grainage sector are as follows:

1. $Y_1 = f$ (X_1, X_6 and X_{10})
2. $Y_2 = f$ (X_1, X_2 and X_5,)
3. $Y_3 = f$ (X_1 and X_6)
4. $YC_1 = f$ (XC_1, XC_2, XC_5 and XC_8)
5. $YC_2 = f$ (XC_1, XC_5 and XC_9)
6. $YC_3 = f$ (XC_1 and XC_5)
7. $YB_2 = f$ (XB_1, XB_4 and XB_6)
8. $YB_3 = f$ (XB_1 and XB_2)
9. $YS_1 = f$ (XS_4 and XS_2)
10. $YS_2 = f$ (XS_2, XS_5, XS_6 and XS_8)
11. $YS_3 = f$ (XS_1, XS_4 and XS_5)
12. $YV_1 = f$ (XV_1 and XV_{10})
13. $YV_2 = f$ (XV_1)
14. $YV_3 = f$ (XV_1)
15. $YA_1 = f$ (XA_4 and XA_{10})
16. $YA_2 = f$ (XA_1 and XA_9)
17. $YA_3 = f$ (XA_1, XA_4, XA_9 and XA_5)

Correlation Coefficient Matrix of dependent and explanatory variables in grainage sector are as follows:

1.

	Y_1	X_1	X_6	X_{10}
Y_1	1.0000			
X_1	.6436	1.0000		
X_6	.1081	.2178	1.0000	
X_{10}	10.0413	.4019	.1746	1.0000

2.

	Y_2	X_1	X_2	X_5	X_6
Y_2	1.0000				
X_1	.9081	1.0000			
X_2	.7244	.9292	1.0000		
X_5	.4838	.3087	.1577	1.0000	
X_6	.0433	.2178	.2919	.0608	1.0000

3.

	Y_3	X_1	X_6
Y_3	1.0000		
X_1	.9765	1.0000	
X_6	.1307	.2178	1.0000

4.

	YC_1	XC_2	XC_5	XC_8	XC_{10}
YC_1	1.0000				
XC_2	.049	1.0000			
XC_5	.625	0.062	1.0000		
XC_8	.5026	0.265	.549	1.0000	
XC_{10}	.176	0.944	.085	.295	1.0000

5.

	YC_2	XC_1	XC_5	XC_9
YC_2	1.0000			
XC_1	.8572	1.0000		
XC_5	.4136	.0846	1.0000	
XC_9	.2172	.4311	.0911	1.0000

6.

	YC_3	XC_1	XC_5
YC_3	1.0000		
XC_1	.8844	1.0000	
XC_5	.3689	.0846	1.0000

7.

	YB_2	XB_1	XB_4	XB_6
YB_2	1.0000			
XB_1	.9026	1.0000		
XB_4	.4548	.3497	1.0000	
XB_6	.0550	.0911	.1398	1.0000

8.

	YB_3	XB_1	XB_2
YB_3	1.0000		
XB_1	.5059	1.0000	
XB_2	.4085	.8287	1.0000

9.

	YV_1	XV_1	XV_{10}
YV_1	1.0000		
XV_1	.6798	1.0000	
XV_{10}	.2854	.7916	1.0000

10.

	YV_2	XV_1
YV_2	1.0000	
XV_1	.9859	1.0000

11.

	YV_3	XV_1
YV_3	1.0000	
XV_1	.9793	1.0000

12.

	YS_1	XS_2	XS_4
YS_1	1.0000		
XS_2	- .442	1.0000	
XS_4	.5348	.304	1.0000

13.

	YS_2	XS_2	XS_5	XS_6	XS_8
YS_2	1.0000				
XS_2	.9396	1.0000			
XS_5	.8463	.7941	1.0000		
XS_6	-.2358	-.0610	-.2450	1.0000	
XS_8	-.0378	.0212	.3399	.06661	1.0000

14.

	YS_3	XS_1	XS_4	XS_5
YS_3	1.0000			
XS_1	.9479	1.0000		
XS_4	.7002	.7412	1.0000	
XS_5	.6229	.4119	.1072	1.0000

15.

	YA_1	XA_4	XA_{10}
YA_1	1.0000		
XA_4	-.1850	1.0000	
XA_{10}	.8780	.2560	1.0000

16.

	YA_2	XA_1	XA_9
YA_2	1.0000		
XA_1	.9695	1.0000	
XA_9	.2757	.4114	1.0000

17.

	YA_3	XA_1	XA_4	XA_5	XA_9
YA_3	1.0000				
XA_1	.994	1.0000			
XA_4	.626	.654	1.0000		
XA_5	.112	.161	.043	1.0000	
XA_9	.435	.411	.482	.086	1.0000

6.2 SILKWORM REARING SECTOR (SWR)

The structural equations have been prepared on both annual and bund basis. The nomenclature to be used is as follows:

Y_1: Annual production of green cocoon (in Kg.).

Y_2: Annual production of green cocoon (in Kg.) per 100 DFLs.

Y_3: Annual output in SWR (in Rs.) (Value of produced cocoon+wastage+fuel).

Y_4: Annual output per 100 DFLs (in Rs.).

Y_5: Annual Income in SWR (in Rs.).

Y_6: Annual production of mulberry leaves (in Quintal).

X_1: Annual cost of hired labour for SWR (in Rs.).

X_2: Annual cost of self employed labour for SWR (in Rs.).

X_3: Annual expenditure for mulberry cultivation (in Rs.).

X_4: Annual cost on disinfectants for maintenance of tools for SWR (in Rs.).

X_5: Annual cost on disinfectants for maintenance of building of SWR (in Rs.).

X_6: Fixed capital assets (in Rs.).

X_7: Annual cost of DFLs (in Rs.).

X_8: Annual cost of mulberry leaves purchased (in Rs.).

X_9: Annual cost of hired labour for mulberry cultivation (in Rs.).

X_{10}: Annual cost of manure and fertiliser (in Rs.).

X_{11}: Annual cost of irrigation (in Rs.).

X_{12}: Depreciation cost of established mulberry garden (in Rs.).

X_{13}: Size of plot (in Acre).

X_{14}: Self employed labour used in mulberry cultivation (in Rs.).

X_{15}: % of Land under high yielding varieties in mulberry.

YC_1: Production of green cocoon in Chaitra bund (in Kg.).

YC_2: Production of green cocoon in Chaitra bund per 100 DFLs (in Kg.).

YC_3: Output in Chaitra bund in SWR (in Rs.).

YC_4: Output in Chaitra bund per 100 DFLs in SWR (in Rs.).

YC_5: Income in Chaitra bund in SWR (in Rs.).

XC_1: Cost of hired labour in Chaitra bund for SWR (in Rs.).

XC_2: Cost of self employed labour in Chaitra bund for SWR (in Rs.).

XC_3: Expenditure for mulberry cultivation in Chaitra bund (in Rs.).

XC_4: Cost on disinfectants for maintenance of tools in Chaitra bund for SWR (in Rs.)

XC_5: Cost on disinfectants for maintenance of building in Chaitra bund for SWR (in Rs.).

XC_6: Fixed capital assets (in Rs.).

XC_7: Cost of DFLs in Chaitra bund for SWR (in Rs.).

XC_8: Cost of Mulberry leaves purchased in Chaitra bund for SWR (in Rs.).

YB_1: Production green cocoon in Baishakhi bund (in Kg.).

YB_2: Production of green cocoon in Baishakhi bund per 100 DFLs (in Kg.).

YB_3: Output in Baishakhi bund in SWR (in Rs.).

YB_4: Output in Baishakhi bund per 100 DFLs in SWR (in Rs.).

YB_5: Income in Baishakhi bund in SWR (in Rs.).

XB_1: Cost on hired labour in Baishakhi bund for SWR (in Rs.).

XB_2: Cost on self employed labour in Baishakhi bund for SWR (in Rs.).

XB_3: Expenditure for mulberry cultivation in Baishakhi bund (in Rs.).

XB_4: Cost on disinfectants for maintenance of tools in Baishakhi bund for SWR (in Rs.).

XB_5: Cost on disinfectants for maintenance of building in Baishakhi bund for SWR (in Rs.)

XB_6: Fixed capital assets (in Rs.).

XB_7: Cost of DFLs in Baishakhi bund for SWR (in Rs.).

XB_8: Cost of mulberry leaves purchased in Baishakhi bund for SWR (in Rs.).

YV_1: Production of green cocoon in Bhaduri bund (in Kg.).

YV_2: Production of green cocoon in Bhaduri bund per 100 DFLs (in Kg.).

YV_3: Output in Bhaduri bund in SWR (in Rs.).

YV_4: Output in Bhaduri bund per 100 DFLs (in Rs.).

YV_5: Income in Bhaduri bund in SWR (in Rs.).

XV_1: Cost on hired labour in Bhaduri bund for SWR (in Rs.).

XV_2: Cost on self employed labour in Bhaduri bund for SWR (in Rs.).

XV_3: Expenditure for mulberry cultivation in Bhaduri bund (in Rs.).

XV_4: Cost on disinfectants for maintenance of tools in Bhaduri bund for SWR (in Rs.).

XV_5: Cost on disinfectants for maintenance of building in Bhaduri bund for SWR (in Rs.).

XV_6: Fixed capital assets (in Rs.).

XV_7: Cost of DFLs in Bhaduri bund for SWR (in Rs.).

XV_8: Cost of mulberry leaves purchased in Bhaduri bund for SWR (in Rs.).

YA_1: Production of green cocoon in Aghrani bund (in Kg.).

YA_2: Production of green cocoon in Aghrani bund per 100 DFLs (in Kg.).

YA_3: Output in Aghrani bund in SWR (in Rs.).

YA_4: Output in Aghrani bund per 100 DFLs in SWR (in Rs.).

YA_5: Income in Aghrani bund in SWR (in Rs.).

XA_1: Cost on hired labour in Aghrani bund for SWR (in Rs.).

XA_2: Cost on self employed labour in Aghrani bund for SWR (in Rs.).

XA_3: Expenditure for mulberry cultivation in Aghrani bund for SWR (in Rs.).

XA_4: Cost on disinfectants for maintenance of tools in Aghrani bund for SWR (in Rs.).

XA_5: Cost on disinfectants for maintenance of building in Aghrani bund for SWR (in Rs.).

XA_6: Fixed capital assets (in RS.).

XA_7: Cost on DFLs in Aghrani bund for SWR (in Rs.).

XA_8: Cost of mulberry leaves purchased in Aghrani bund for SWR (in Rs.).

The structural relationship obtained from regression analysis is as follows:

6.2.1 (i) Annual production of green cocoon in kg.:

Annual production of green cocoon in kg. (Y_1) has been regressed on cost of hired labour (X_1), cost on self employed labour (X_2), cost on disinfectants for maintenance of tools (X_4), maintenance cost on disinfectants of building (X_5), Fixed Capital assets (X_6), cost of DFLs (X_7) and cost of mulberry leaves purchased (X_8). The regression equation so estimated is:

$$Y_1 = 51.873 + .021\overset{*}{X_1} + .019\overset{*}{X_2} - .043\overset{**}{X_4} + .041\overset{**}{X_5} +$$
$$\quad (16.539) \quad (.0067) \quad (.004) \quad (.018) \quad (.019)$$

$$.0007\overset{**}{X_6} + .112\overset{*}{X_7} + .006\overset{*}{X_8} \qquad : R^2 = .84^{*}$$
$$(.0004) \quad (.020) \quad (.002)$$

As the reported R^2 of this equation is very high, it indicates the efficiency of the right hand side variables i.e. X_1, X_2, X_4, X_5, X_6, X_7 and X_8 in explaining the variations in Y_1 very high.

The marginal contributions of X_1, X_2, X_4, X_5, X_6, X_7 and X_8 on Y_1 keeping other variables fixed are .021, .019, .043, .041, .0007, .112, .006 respectively. The explained variation by the above regression is 84% of the total variations of Y_1. Explanatory variables X_1, X_2, X_5, X_6, X_7 and X_8 have a positive impact on the dependent variable but their relative impact is of low magnitude. X_4 has a negative influence on Y_1. It has been observed in the field survey that disinfectants like formalin, bleaching powder, cowdung are not scientifically used. Through traditional experience the rearers have learnt that the disinfectants mentioned above are likely to control pests and diseases. Hence, a positive impact on quality of production, but due to lack of proper training in most cases, disinfectants are not administered in the right proportion and at a right time. Therefore, the results are not always beneficial. This has caused the X_4 variable to induce a decreasing impact on Y_1.

(ii) Annual production of green cocoon in kg. per 100 DFLs:

Annual production of green cocoon per 100 DFLs (Y_2) has been regressed on hired labour (X_1), cost of self employed labour (X_2), fixed capital assets (X_6) and cost of DFLs (X_7). Y_2 was also regressed on other variables like X_3, X_4, X_5 and X_8, but no significant influences of these said variables on Y_2 were found. Therefore, these variables are excluded from the regression equation. The regression equation so fitted is:

$$Y_2 = \underset{(1.487)}{.699} + \underset{(.008)}{.015X_1^{**}} + \underset{(.003)}{.010X_2^{*}} + \underset{(.0003)}{.0014X_6^{*}} + \underset{(.022)}{.112X_7^{*}} \qquad : R^2 = .55^{*}$$

The reported R^2 is only .55, which is moderately successful in explaining the variations in Y_2 as 45% remains unexplained. All the policy variables have an increasing impact on Y_2, however, their magnitude is low except the value associated with X_7.

The marginal contribution of X_1, X_2, X_6 and X_7 on Y_2 keeping other variables fixed are .015, .010, .0014, and .112 respectively. The explained variation by the above regression is only 55% of the total variation of Y_2.

(iii) Annual output in SWR (in Rs.):

Annual output (Y_3) has been regressed on annual cost of hired labour (X_1), cost of self employed labour (X_2), cost on disinfectants for maintenance of building (X_5), cost of DFLs (X_7) and cost of mulberry purchased (X_8). Y_3 was also regressed on X_3 and X_4, but no significant influence of these variables on Y_3 ware found; therefore, these variations are excluded from the regression equation. The regression equation so estimated is:

$$Y_3 = \underset{(1292.8)}{3781.9} + \underset{(.439)}{.900X_1^{***}} + \underset{(.258)}{.884X_2^{*}} + \underset{(1.439)}{4.454X_5^{*}} + \underset{(1.508)}{10.572X_7^{*}} + \underset{(.153)}{.582X_8^{*}} \qquad : R^2 = .84^{*}$$

The value of R^2 is very high, therefore, it can be concluded that the explanatory variables are capable of explaining the variations in the annual output in silkworm rearing.

The marginal contribution of X_1, X_2, X_5, X_7 and X_8 on Y_3 keeping other variables fixed are .900. .884, 4.454, 10.512 and .582 respectively. The explained variation by the above regression is 84% of the total variation on Y_3. The variables X_1, X_2, X_5, X_7 and X_8 have a positive influence on Y_3.

The impact of both types of labour, hired and self-employed, though positive, is of low magnitude. X_5 i.e. impact of good housing condition due to proper maintenance is of great importance as the worms are highly susceptible to adverse weather conditions. At times the whole crops of a season is lost due to lack of proper safeguard from rough weather. However, X_7 has maximum increasing impact on Y_3 as good quality DFLs is by far the most decisive factor in good output; which will ultimately gain better prices in the market.

(iv) Annual output per 100 DFLs (in Rs.):

Annual output per 100 DFLs (Y_4) has been regressed on fixed capital (X_6) and cost of DFLs (X_7). Y_4 was regressed on other variables (X_1, X_2, X_3, X_4, X_5 and X_8), but no significant influences on Y_4 were found. Therefore, these variables are excluded from the regressed equation. The regression equation so estimated is:

$$Y_4 = 5.928 + 0.143X_6^{*} + 12.592X_7^{*} \qquad : R^2 = .54^{*}$$
$$(113.66) \quad (.027) \qquad (1.727)$$

The value of R^2 is only .54, which indicates that X_6 and X_7 together explains only 54% variation in Y_4. 46% remains unexplained. Though both the independent variable influences Y_4 positively but the impact of X_7 is very high.

(v) Annual income in SWR (in Rs.):

Annual income of the rearer (Y_5) has been regressed on cost of DFLs (X_7). Y_5 was also regressed on other variables like X_1, X_2, X_3, X_4, X_5, X_6 and X_8 but no significant influences were found; therefore, these variables are excluded from the regressed equation. The regression equation so estimated is:

$$Y_5 = -171.880 + 6.463X_7^{*} \qquad : R^2 = .62^{*}$$
$$(1074) \qquad (.7621)$$

It is evident from the equation that R^2 is moderately high, thus the independent variable moderately explains Y_5.

62% of the total variation in Y_5 is being explained by the explanatory variable and the rest 38% remains unexplained. X_7 has a positive impact on Y_5 and unit rate of increase is Rs. 6.46.

(vi) Annual production of mulberry leaves (in quintal):

Annual production of Mulberry leaves (Y_6) has been regressed on the size of the plot (X_{13}) and % of land under high yielding varieties (X_{15}). Y_6 was regressed on other variables (X_9, X_{10}, X_{11}, X_{12} and X_{14}) but no significant influence of these said variables on Y_6 were found. Therefore, these variables are excluded from the regressed equation. The regression equation so fitted is:

$$Y_6 = -10.78 + .011\overset{**}{X_{13}} + 179.49\overset{*}{X_{15}} \qquad : R_2 = .9\overset{*}{7}$$

$$(3.271) \quad (.005) \quad (3.939)$$

R^2 being sufficiently high in this case upholds that the independent variables are capable of explaining the dependent variable in conformity with the maintained hypothesis. The explained variation by the above regression is 97% of the total variation of Y_6. The variables X_{13} and X_{15} have a positive influence on Y_6 and the magnitude of the increasing impact of X_{15} is very high, as the area is suited to HYV crops.

6.2.2 (i) Production of green cocoon in Chaitra bund (in Rs.):

Production of green cocoon in Chaitra bund (YC_1) has been regressed on cost of hired labour in Chaitra bund (XC_1), cost of self employed labour (XC_2), fixed capital assets (XC_6), cost of DFLs (XC_7) and cost of mulberry leaves purchased (XC_8). YC_1 was also regressed on other variables like XC_3, XC_4 and XC_5. But no significant influences on YC_1 were found. Therefore, these variables are excluded from the regressed equation. The regression equation so estimated is:

$$YC_1 = -1.930 + .014\overset{*}{X}C_1 + 008\overset{**}{X}C_2 + .065\overset{**}{X}C_6 + .086\overset{*}{X}C_7 + .006\overset{*}{X}C_8 \qquad : R^2 = .7\overset{*}{7}$$

$$(5.553) \quad (.004) \quad .003) \quad (.025) \quad (.015) \quad (.002)$$

As the reported R^2 of this equation is moderately high, thus the independent variable moderately explained YC_1. The explained variation by the above regression is 77% of the total variation of YC_1. All the above variables have a positive influence on YC_1 but this relative impact is of low magnitude.

(ii) Production of green cocoon in Chaitra bund per 100 DFLs (in kg.):

Production of cocoon in Chaitra bund per 100 DFLs (YC_2) has been regressed on cost of hired labour (XC_1), cost of self employed labour (XC_2), fixed capital assets (XC_6), cost of DFLs (XC_7) and cost of Mulberry leaves purchased (XC_8). YC_2 was also regressed on the variables XC_3, XC_4 and XC_5 but no significant influences on YC_2 were found, therefore, these variables are excluded from the regression equation. The regression equation so fitted is:

$$YC_2 = 3.374 + .009\overset{***}{XC_1} + .005\overset{***}{XC_2} + .0005\overset{*}{XC_6} + .059\overset{*}{XC_7} + .006\overset{*}{XC_8} \quad : R^2 = .4\overset{*}{0}$$

$$(2.254) \quad (.005) \quad (.003) \quad (.0002) \quad (.017) \quad (.002)$$

The value of R^2 is only .40, which indicates the all the above variables XC_1, XC_2, XC_6, XC_7 and XC_8 put together explain only 40% variation in YC_2. 60% remains unexplained. The marginal contribution of XC_1, XC_2, XC_6, XC_7 and XC_8 on YC_2 keeping other variables fixed are .009, .005, .0005, .059, .006 respectively. Though the above independent variables influence YC_2 positively, their relative impact is of low magnitude.

(iii) Output in Chaitra bund in SWR (in Rs.):

Output in Chaitra bund (YC_3) has been regressed on cost of hired labour (XC_1), Cost of self employed labour (XC_2), cost on disinfectants for maintenance of building (XC_5), cost of DFLs (XC_7) and cost of Mulberry leaves purchased (XC_8). YC_3 was regressed on other variables (XC_3, XC_4 and XC_6) but no significant influences on YC_3 were found; therefore, these variables are excluded from the regressed equation. The regression equation so fitted is:

$$YC_3 = -678.88 + .621\overset{***}{XC_1} + .670\overset{**}{XC_2} + 5.352\overset{**}{XC_5} + 8.955\overset{*}{XC_7} + 6.42\overset{*}{XC_8} : R^2 = .7\overset{*}{7}$$

$$(494.83) \quad (.326) \quad (.292) \quad (2.268) \quad (1.388) \quad (.147)$$

It is evident from the equation that R_2 being moderately high indicated the variables conclusively explained the dependent variable moderately. The explained variation by the above regression is 77% of the total variation of YC_3.

The marginal contribution of XC_1, XC_2, XC_5, XC_7 and XC_8 on YC_3 keeping other variables fixed are .621, .670, 5.352, 8.955, and 6.42 respectively. The variables XC_1, XC_2, XC_5, XC_7 and XC_8 have a positive influence on YC_3. The impact of hired and self-employed labour is positive but they are of low magnitude compare to the other variables like X_5 and X_7. Chaitra bund is very important bund in Malda district because of favourable climate. This bund is suitable for both F_1 and Nistari silkworm. Generally majority of the rearers prefer F_1 DFLs, which gives a higher production. But F_1 silkworm needs extra care and diseases easily affect this type of worm. So maintenance of room for controlled environment is essential. XC_7 has a positive impact on YC_3 and per unit rate of increase is Rs. 8.95.

(iv) Output in Chaitra bund per 100 DFLs in SWR (in Rs.):

Output in Chaitra bund per 100 DFLs (YC_4) has been regressed on fixed capital assets (XC_6), cost of DFLs (XC_7) and cost of Mulberry leaves purchased (XC_8). YC_4 was regressed on other variables (XC_1, XC_2, XC_3, XC_4 and XC_5) but no significant influences of these variables on YC_4 were found. Therefore, these variables are excluded from the regressed equation. The regression equation so fitted is:

$$\underset{}{YC_4}=\underset{(177.89)}{232.850}+\underset{(.011)}{.042\overset{*}{XC_6}}+\underset{(1.559)}{7.145\overset{*}{XC_7}}+\underset{(.155)}{.634\overset{*}{XC_8}} \qquad : R^2 = .4\overset{*}{3}$$

The marginal contribution of XC_6, XC_7 and XC_8 on YC_4 keeping other variables fixed are .042, 7.145, and .634 respectively. The explained variation by the above regression is 43% of the total variation of YC_4. The variables XC_6, XC_7 and XC_8 have a positive influence on YC_4. XC_7 has positive effect on YC_4 and its per unit rate of increase is also high, i.e., Rs. 7.14. Another important variable XC_8 has a positive impact on YC_4 because usually mulberry leaves purchased from outside are of good quality. Superior quality of silkworms requires good quality of mulberry leaves. Beside different types of diseases are spread through mulberry leaves, so good quality mulberry leaves benefit silkworm production in more than one ways.

(v) Income in Chaitra bund in SWR (Rs.):

Income in Chaitra bund in SWR (YC_5) has been regressed on cost of DFLs (XC_7). YC_5 was regressed on other variables (XC_1, XC_2, XC_3, XC_4, XC_5, XC_6 and XC_8). But no significant influence of these said variables were found. So these variables are excluded from the regressed equation. For the Chaitra bund regression equation so fitted is:

$$YC_5 = \underset{(220.74)}{449.29} + \underset{(1.28)}{4.223}\overset{*}{X}C_7 \qquad : R^2 = .45^{*}$$

As the reported R^2 is only .45, it is moderately successful in explaining the variation in YC_5. As 55% remains unexplained. XC_7 has a positive impact on YC_5 and unit rate of increase is Rs. 4.22. It can be noted that rearers of Malda district always prefer F_1 silkworm in the Chaitra bund because of favourable climatic conditions. Generally F_1 silk worms can render a superior quality of cocoon that can fetch higher price in the market. Naturally income will rise if use of XC_7 is more.

6.2.3 (i) Production of green cocoon in Baishakhi bund (in kg.):

The production of green cocoon in Baishakhi bund (YB_1) has been regressed on cost of hired labour (XB_1) and fixed capital assets (XB_6). YB_1 was regressed on other variables (XB_2, XB_3, XB_4, XB_5, XB_7 and XB_8) but no significant influences of these variables on YB_1 were found.

Therefore, these variables have been excluded from the regressed equation. For the production of cocoon in Baishakhi bund, the regression equation so estimated is:

$$YB_1 = \underset{(5.63)}{18.132} + \underset{(.013)}{.023}\overset{***}{X}B_1 + \underset{(.0001)}{.0009}\overset{*}{X}B_6 \qquad : R^2 = .38^{*}$$

The value of R^2 is only .38, which indicates that XB_1 and XB_6 together explain only 38% of YB_1. 62% remain unexplained. Though both the independent variables influence positively their magnitude is very low. A hot climate prevails in this bund. The production gets affected adversely as diseases like pebrin, lali are common features of this bund. However, adverse climatic conditions can be controlled in modern silkworm rearing house but they are few in number. Hired labour also has a positive impact on YB_1 because hired labour work almost efficiently always whereas family members have other works to attend. So SWR do not get full attention, which is absolutely essential for a good crop.

(ii) Production of cocoon in Baishakhi bund per 100 DFLs:

Production of cocoon in Baishakhi bund per 100 DFLs (YB_2) has been regressed on cost of hired labour (XB_1), cost on disinfectants for maintenance of tools (XB_4) and fixed capital assets (XB_6). YB_2 was regressed on other variables but no significant influences on YB_2 were found. Therefore, these variables are excluded from the regressed equation. For the Baishakhi bund the regression equation so fitted is:

$$YB_2 = -5.822 + .123\overset{*}{X}B_1 + .027\overset{*}{X}B_4 + .052\overset{*}{X}B_6 \qquad : R^2 = .6\overset{*}{9}$$
$$(1.712) \quad (.030) \quad (.004) \quad (.011)$$

It is evident from the equation that R^2 being moderately high in this equation upholds that the variables conclusively explain the dependent variable in conformity with the maintained hypothesis. The explained variation by the above regression is 69% of the total variation of YB_2.

The marginal contribution of XB_1, XB_4 and XB_6 on YB_2 keeping other variables fixed are .123, .027, and .052 respectively. The role of the individual explanatory variable is conveyed by the coefficients associated with them. It can be seen that XB_6 has a positive influence on YB_2 because the modern SWR house can control high temperature. Different types of diseases are predominant in this bund. So maintenance of disinfected tools is highly essential for quality crop in this bund. In this bund all the steps of work related to SWR should be done at a proper time and it can be effectively done by hired labour only.

(iii) Output in Baishakhi bund (Rs.):

Output in Baishakhi bund (YB_3) has been regressed on hired labour cost (XB_1), self-employed labour cost (XB_2), maintenance cost of disinfected tools (XB_4), maintenance cost of building (XB_5) and fixed capital assets (XB_6). For the output in Baishakhi bund the regression equation so fitted is:

$$YB_3 = -931.36 + 2.285\overset{*}{XB_1} + 1.572\overset{*}{XB_2} - 3.925\overset{***}{XB_4} + 5.29\overset{**}{XB_5} + .057\overset{*}{XB_6} : R^2 = .5\overset{*}{5}$$

$$(548.87)\quad(.855)\quad(.418)\quad(2.286)\quad(2.545)\quad(.012)$$

The value of R^2 is .55 which indicates that XB_1, XB_2, XB_4, XB_5 and XB_6 together explain only 55% variation in YB_3. 45% remains unexplained.

The marginal contribution of XB_1, XB_2, XB_4, XB_5 and XB_6 on YB_3 keeping other variables fixed are 2.285, 1.572, 3.925, 5.29, and .057 respectively. The variables XB_1, XB_2, XB_5 and XB_6 have a positive impact on YB_3 whereas XB_4 has negative influence on YB_3. It is evident from the survey that almost all the rearers use formaline, bleaching powder and cowdung for cleaning of all the tools that are used in SWR. But high temperature reacts adversely. This unscientific use of disinfectants does not bring desired beneficial effects.

(iv) Output in Baishakhi (in Rs.) bund per 100 DFLs in SWR:

Output in Baishakhi bund per 100 DFLs (YB_4) has been regressed on cost of hired labour (XB_1), cost of self employed labour (XB_2), fixed capital assets (XB_6) and cost for DFLs (XB_7). For the Baishakhi bund the regression equation so fitted is:

$$YB_4 = -711.40 + 4.003\overset{*}{XB_1} + 1.888\overset{**}{XB_2} + .028\overset{**}{XB_6} + 11.539\overset{*}{XB_7} \qquad : R^2 = .7\overset{*}{4}$$

$$(138.41)\quad(.847)\quad(.309)\quad(.012)\quad(2.335)$$

It is evident from the equation that R^2 being moderately high upholds that the variables conclusively explain the dependent variable in conformity with the maintained hypothesis. The explained variation by the above regression is 74% of the total variation of YB_4.

The marginal contribution of XB_1, XB_2, XB_6 and XB_7 on YB_4 keeping other variables fixed are 4.003, 1.888, .028, and 11.539 respectively. The value variables XB_1, XB_2, XB_6 and XB_7 have a positive influence on YB_4.

(v) Income in Baishakhi bund in SWR (in Rs.):

Income in Baishakhi bund (YB_5) has been regressed on cost of DFLs (XB_7) only. YB_5 was regressed on other variables (XB_1, XB_2, XB_3, XB_4, XB_5, XB_6 and XB_8) but no significant influences of these variables on YB_5 were found, therefore, these variables are excluded from the regressed equation for the Baishakhi bund. The regression equation so fitted is:

$$YB_5 = \underset{(458.82)}{154.01} + \underset{(.009)}{.037}\overset{*}{X}B_7 \qquad : R^2 = .39^*$$

The value of R^2 is as low as .39, which indicates that XB_7 explain only 39% variation of YB_5. Though the independent variable XB_7 has a positive influence on YB_5, the impact is very low value. Hot climate copped with low rate of irrigation leads to low production of mulberry leaves. Various adverse reasons render this bund unfavourable for SWR.

6.2.4 (i) Production of green cocoon in Bhaduri bund (in kg.):

Production of green cocoon in Bhaduri bund (YV_1) has been regressed on fixed capital assets (XV_6) and cost of DFLs (XV_7). YV_1 was regressed on other variables (XV_1, XV_2, XV_3, XV_4, XV_5 and XV_8); but no significant influences on YV_1 were found. Therefore, these variables have been excluded from the regressed equation. For the production of green cocoon in Bhaduri bund the regression equation so estimated is:

$$YV_1 = \underset{(4.530)}{10.447} + \underset{(.00008)}{.0003}\overset{*}{X}V_6 + \underset{(.023)}{.124}\overset{*}{X}V_7 \qquad : R^2 = .48^*$$

The reported R^2 is only .48 which means that it is moderately successful in explaining the variation in YV_1 though 52% remains unexplained.

The marginal contribution of XV_6 and XV_7 on YV_1 keeping other variables fixed on .0003 and .124. The explained variation by the above regression is 48% of the total variation of YV_1. Both the variables XV_6 and XV_7 influence YV_1 positively but the magnitude of the increasing impact of these variables are low. Excessive rainfall affects the production in this bund adversely.

(ii) Output in Bhaduri bund in SWR (in Rs.):

Output in Bhaduri bund (YV_3) has been regressed on cost of DFLs (XV_7) only. YV_3 was regressed on other variables (XV_1, XV_2, XV_3, XV_4, XV_5, XV_6 and XV_8), but no significant influences on YV_3 were found. Therefore, these variables are excluded from the regressed equation. For the Bhaduri bund the regression equation so fitted is:

$$YV_3 = 108.55 + 12.076\overset{*}{X}V_7 \qquad : R^2 = .5\overset{*}{2}$$
$$(281.16) \quad 1.092)$$

It is evident from the equation that R^2 is moderate i.e. .52 and this independent variable explains the dependent variable.

52% of the total variation in YV_3 is being explained by the explanatory variable and the rest 48% remains unexplained. XV_7 has a positive impact on YV_3 and unit rate of increase is pretty high i.e. Rs. 12.07.

6.2.5 (i) Production of green cocoon in Aghrani bund (in kg.):

Production of green cocoon in Aghrani bund (YA_1) has been regressed on maintenance cost of building (XA_5) and cost of DFLs (XA_7). YA_1 were regressed on other variables (XA_1, XA_2, XA_3, XA_4, XA_6 and XA_8), but no significant influences on YA_1 were found. Therefore, these variables are excluded from the regressed equation. For the said bund the regression equation so estimated is:

$$YA_1 = 12.62 + .167\overset{*}{X}A_5 + .113\overset{*}{X}A_7 \qquad : R^2 = .5\overset{*}{3}$$
$$(8.73) \quad (.020) \qquad (.041)$$

The value of R^2 is only .53, which indicates that XA_5 and XA_7 together explain only 53% variations of YA_1. 47% remains unexplained. Though both the independent variables influence YA_1 positively the impact of XA_5 are of high magnitude that of XA_7. Diseases are common occurrence in Baishakhi bund and Bhaduri bund, which necessitates the needs of maintenance of room as a compulsion before harvest in the Aghrani bund. Maintenance cost of building thus has a positive impact on YA_1.

(ii) Production of green cocoon per 100 DFLs in Aghrani bund (in kg.):

Production of cocoon in Aghrani bund (YA_2) has been regressed on cost of DFLs (XA_7) and cost of mulberry leaves purchased (XA_8). YA_2 was regressed on other variables (XA_1, XA_2, XA_3, XA_4, XA_5 and XA_6), but no significant influences on YA_2 were found. Therefore these variables have been excluded from the regressed equation. For the said bund the regression equation so fitted is:

$$YA_2 = \underset{(1.543)}{8.074} + \underset{(.020)}{.104^{*}XA_7} + \underset{(.002)}{.009^{*}XA_8} \qquad : R^2 = .56^{*}$$

It is evident from the above regression that R^2 is moderately high thus the independent variables moderately explain the objective variable. 56% of the total variation in YA_2 is being explained by the explanatory variables and the rest 44% remains unexplained.

The marginal contributions of XA_7 and XA_8 on YA_2 keeping other variables fixed are .104 and .009 respectively. The variables XA_7 and XA_8 have a positive influence on YA_2 but their magnitude is very low.

(iii) Output in Aghrani bund (in Rs.):

Output in Aghrani bund (YA_3) has been regressed on cost of maintenance of building (XA_5), cost of DFLs (XA_7) and cost of mulberry leaves purchased (XA_8). YA_3 were regressed on other variables (XA_1, XA_2, XA_3, XA_4 and XA_6) but no significant influence on YA_3 were found. Therefore, these variables have been excluded from regressed equation. For the said bund the regression equation so estimated is:

$$YA_3 = \underset{(759.42)}{271.300} + \underset{(3.333)}{15.475^{*}XA_5} + \underset{(1.600)}{8.802^{*}XA_7} + \underset{(.249)}{.537^{**}XA_8} \qquad : R^2 = .57^{*}$$

The reported R^2 is only .57. It is moderately successful in explaining the variations in YA_3 as 43% remains unexplained. The explained variation by regression is 57% of the total variation of YA_3.

The marginal contributions of XA_5, XA_7 and XA_8 on YA_3 keeping other variables fixed are 15.475, 8.802, .537 respectively. All the policy variables have increasing impact on YA_3 and their magnitude is high except the co-efficient associated with XA_8.

(iv) Output in Aghrani bund per 100 DFLs in SWR:

Output in Aghrani bund per 100 DFLs (YA_4) has been regressed on cost of hired labour (XA_1), fixed capital assets (XA_6) and cost of DFLs (XA_7). YA_4 was regressed on other variables (XA_2, XA_3, XA_4, XA_5 and XA_8) but no significant influences on YA_4 were found. Therefore, these variables are excluded from the regressed equation. For the Aghrani bund the regression equation so estimated is:

$$YA_4 = \underset{(135.82)}{358.48} - \underset{(.755)}{1.106}\overset{***}{XA_1} + \underset{(.019)}{.037}\overset{*}{XA_6} + \underset{(1.637)}{13.110}\overset{*}{XA_7} \qquad : R^2 = .59^{*}$$

The reported R^2 is .59. It is moderately successful in explaining the variation in YA_4 as 41% remains unexplained. The explained variation by the above regression is 59% of the total variation of YA_4. The variables XA_6 and XA_7 have a positive influence on YA_4 whereas XA_1 has a negative influence on YA_4.

(v) Income in Aghrani bund (in Rs.):

Income of the rearer in Aghrani bund (YA_5) has been regressed on maintenance cost on disinfectants of building (XA_5) only. YA_5 were regressed on other variables (XA_1, XA_2, XA_3, XA_4, XA_6, XA_7 and XA_8), but no significant influences on YA_5 were found. Therefore, these variables are excluded from the regressed equation. For the income generation in Aghrani bund the regression equation so fitted is:

$$YA_5 = \underset{(688.37)}{187.51} + \underset{(2.728)}{15.650}\overset{*}{XA_5} \qquad : R^2 = .24^{*}$$

The reported R^2 value is only .24, which indicates that XA_5 explains only 24% variation of YA_5, 76% remains unexplained. The independent variable XA_5 influences YA_5 positively and unit rate of increase is very high i.e. Rs. 15.65.

Summary of stepwise linear regression of Y_1 (Production of cocoon in kg.), Y_2 (Production per 100 DFLs), Y_3 (Output in Rs.), Y_4 (Output per 100 DFLs), Y_5 (Income of the rearer) and Y_6 (Production of mulberry leaves) of silkworm rearing sector are as follows:

1. $Y_1 = -51.81 + .02X_1^{*} + .02X_2^{*} - .04X_4^{**} + .04X_5^{**} + .001X_6^{**} + .11X_7^{*} + .01X_8^{*}$ $\quad : R^2 = .84^{*}$

   (16.54) (.01) (.01) (.02) (.02) (.0003) (.02) (.002)

2. $Y_2 = -00.69 + 00.01X_1^{**} + 00.01X_2^{*} + 00.001X_6^{*} + 00.11X_7^{*}$ $\quad : R^2 = .55^{*}$

   (1.49) (00.001) (00.002) (00.0003) (00.02)

3. $Y_3 = 3781.90 + 00.90X_1^{***} + 00.88X_2^{*} + 04.45X_5^{*} + 10.51X_7^{*} + 00.58X_8^{*}$ $\quad : R^2 = .84^{*}$

   (1292.80) (00.44) (00.25) (01.44) (01.51) (00.15)

4. $Y_4 = 05.93 + 00.14X_6^{*} + 12.59X_7^{*}$ $\quad : R^2 = .54^{*}$

   (113.66) (00.03) (01.73)

5. $Y_5 = -171.88 + 6.46X_7^{*}$ $\quad : R^2 = .62^{*}$

   (1079.60) (0.76)

6. $Y_6 = -10.78 + 00.010X_{13}^{**} + 179.490X_{15}^{*}$ $\quad : R_2 = .97^{*}$

   (03.27) (00.004) (03.940)

7. $YC_1 = -1.93 + 00.01XC_1^{*} + 00.01XC_2^{**} + 00.06XC_5^{**} +$

   (05.55) (00.004) (00.003) (00.020)

   $00.09XC_7^{*} + 00.01XC_8^{*}$ $\quad : R^2 = .77^{*}$

   (00.010) (00.001)

8. $YC_2 = 3.37 + .01XC_1^{*} + 00.005XC_2^{*} + 0.0004XC_6^{*} + 0.06XC_7^{*} + .006XC_8^{*}$ $\quad : R^2 = .40^{*}$

   (2.25) (.005) (.002) (.0001) (0.02) (.002)

$$9.\ YC_3 = -678.88 + 0.62\overset{***}{X}C_1 + 0.66\overset{**}{X}C_2 + 5.35\overset{**}{X}C_5 + 8.95\overset{*}{X}C_7 + 0.64\overset{*}{X}C_8 \quad : R^2 = .77^{*}$$
$$(494.83)\ (0.33)\ (0.29)\ (2.27)\ (1.39)\ (0.15)$$

$$10.\ YC_4 = 232.85 + 0.04\overset{*}{X}C_6 + 7.14\overset{*}{X}C_7 + 0.63\overset{**}{X}C_8 \quad : R^2 = .43^{*}$$
$$(177.89)\ (.01)\ (1.56)\ (0.15)$$

$$11.\ YB_1 = -5.82 + 0.12\overset{*}{X}B_1 + 0.03\overset{*}{X}B_4 + 0.05\overset{*}{X}B_6 \quad : R^2 = .69^{*}$$
$$(1.71)\ (0.03)\ (0.004)\ (.01)$$

$$12.\ YB_3 = -931.36 + 2.28\overset{*}{X}B_1 + 1.57\overset{*}{X}B_2 - 3.92\overset{**}{X}B_4 + 5.29\overset{*}{X}B_5 + 0.06\overset{**}{X}B_6 \quad : R^2 = .55^{*}$$
$$(548.87)\ (0.85)\ (0.42)\ (2.23)\ (2.54)\ (.01)$$

$$13.\ YB_4 = -711.40 + 4.00\overset{*}{X}B_1 + 1.89\overset{*}{X}B_2 + .03\overset{*}{X}B_6 + 11.54\overset{*}{X}B_7 \quad : R^2 = .74^{*}$$
$$(138.41)\ (0.85)\ (0.31)\ (.01)\ (2.33)$$

$$14.\ YB_5 = 154.01 + 0.04\overset{*}{X}B_7 \quad : R^2 = .39^{*}$$
$$(458.82)\ (.01)$$

$$15.\ YV_1 = 10.45 + .0002\overset{*}{X}V_6 + 0.120\overset{*}{X}V_7 \quad : R^2 = .48^{*}$$
$$(4.53)\ (.0001)\ (0.02)$$

$$16.\ YV_3 = 108.55 + 12.08\overset{*}{X}V_7 \quad : R^2 = .52^{*}$$
$$(281.16)\ (1.09)$$

$$17.\ YA_1 = 12.62 + 0.170\overset{*}{X}A_5 + 0.110\overset{*}{X}A_7 \quad : R^2 = .53^{*}$$
$$(8.73)\ (0.04)\ (0.020)$$

$$18.\ YA_2 = 8.07 + 0.100\overset{*}{X}A_7 + 0.010\overset{*}{X}A_8 \quad : R^2 = .56^{*}$$
$$(1.540)\ (0.020)\ (0.010)$$

$$19.\ YA_3 = 271.30 + 15.470\overset{*}{X}A_5 + 8.800\overset{*}{X}A_7 + .540\overset{*}{X}A_8 \quad : R^2 = .57^{*}$$
$$(759.42)\ (3.33)\ (1.60)\ (.25)$$

$$20.\ YA_4 = 358.48 - 1.11\overset{*}{X}A_1 + 0.040\overset{***}{X}A_6 + 13.110\overset{*}{X}A_7 \qquad : R^2 = .59^*$$
$$(135.820)\quad (0.750)\qquad (0.010)\qquad (1.640)$$

$$21.\ YA_5 = 187.51 + 15.650\overset{*}{X}A_5 \qquad : R^2 = .44^*$$
$$(688.37)\quad (2.73)$$

Figures in parenthesis are corresponding standard errors, and *, **, ***, indicate that the parameters are statistically significant at 1%, 5%, 10% level of significance respectively for (n-p-1) degrees of freedom. Where n represents the number of observations and p represents the number of explanatory variables.

Optimum functional models of production in kg. (Y_1), production in Rs. (Y_2), output in Rs. (Y_3), output per 100 DFLs (Y_4), Income (Y_5) and production of mulberry leaves (Y_6), in silkworm rearing sector are as follows:

1. $Y_1 = f\ (X_1, X_2, X_4, X_5, X_6, X_7$ and $X_8)$.
2. $Y_2 = f\ (X_1, X_2, X_6$ and $X_7)$.
3. $Y_3 = f\ (X_1, X_2, X_5, X_7$ and $X_8)$.
4. $Y_4 = f\ (X_6$ and $X_7)$.
5. $Y_5 = f\ (X_7)$.
6. $Y_6 = f\ (X_{13}$ and $X_{15})$.
7. $YC_1 = f\ (XC_1, XC_2, XC_5, XC_7$ and $XC_8)$.
8. $YC_2 = f\ (XC_1, XC_2, XC_6, XC_7$ and $XC_8)$.
9. $YC_3 = f\ (XC_1, XC_2, XC_5, XC_7$ and $XC_8)$.
10. $YC_4 = f\ (XC_5, XC_7$ and $XC_8)$.
11. $YB_1 = f\ (XB_1$ and $XB_6)$.
12. $YB_2 = f\ (XB_1, XB_4$ and $XB_6)$.
13. $YB_3 = f\ (XB_1, XB_2, XB_4, XB_5$ and $XB_6)$.
14. $YB_4 = f\ (XB_1, XB_2, XB_6$ and $XB_7)$.
15. $YB_5 = f\ (XB_7)$.
16. $YV_1 = f\ (XV_6$ and $XV_7)$.
17. $YV_3 = f\ (XV_7)$.
18. $YA_1 = f\ (XA_5$ and $XA_5)$.

19. $YA_2 = f$ (XA_7 and XA_8).

20. $YA_3 = f$ (XA_5, XA_7 and XA_8).

21. $YA_4 = f$ (XA_1, XA_6 and XA_7).

22. $YA_5 = f$ (XA_5).

Correlation Co-efficient Matrix of dependent & Explanatory variables of silkworm rearing sector are as follows:

1.

	Y_1	X_1	X_2	X_4	X_5	X_6	X_7
Y_1	1.000						
X_1	0.621	1.000					
X_2	0.626	0.140	1.000				
X_4	0.665	0.424	0.669	1.000			
X_5	0.672	0.336	0.519	0.673	1.000		
X_6	0.638	0.489	0.451	0.718	0.658	1.000	
X_7	0.879	0.706	0.549	0.723	0.672	0.728	1.000

2.

	Y_2	X_1	X_2	X_6	X_7
Y_2	1.000				
X_1	0.202	1.000			
X_2	0.435	0.435	1.000		
X_6	0.547	0.416	0.283	1.000	
X_7	0.618	0.323	0.245	0.431	1.000

3.

	Y_2	X_1	X_2	X_6	X_7	X_8
Y_2	1.000					
X_1	0.202	1.000				
X_2	0.599	0.140	1.000			
X_5	0.699	0.336	0.519	1.000		
X_7	0.885	0.706	0.549	0.671	1.000	
X_8	0.333	0.094	0.072	0.169	0.233	1.000

4.

	Y_4	X_6	X_7
Y_4	1.000		
X_6	0.578	1.000	
X_7	0.661	0.432	1.000

5.

	Y_5	X_7
Y_5	1.000	
X_7	0.615	1.000

6.

	Y_6	X_{13}	X_{15}
Y_6	1.000		
X_{13}	0.611	1.000	
X_{15}	0.982	0.591	1.000

7.

	YC_1	XC_1	XC_2	XC_6	XC_7	XC_8
YC_1	1.000					
XC_1	0.549	1.000				
XC_2	0.538	0.189	1.000			
XC_6	0.611	0.201	0.505	1.000		
XC_7	0.622	0.566	0.544	0.622	1.000	
XC_8	0.335	0.068	0.062	0.273	0.132	1000

8.

	YC_2	XC_1	XC_2	XC_6	XC_7	XC_8
YC_2	1.000					
XC_1	0.101	1.000				
XC_2	0.281	0.216	1.000			
XC_6	0.392	-0.006	0.298	1.000		
XC_7	0.470	0.066	0.132	0.271	1.000	
XC_8	0.343	-0.113	0.156	-0.063	0.303	1.00

9.

	YC_3	XC_1	XC_2	XC_5	XC_7	XC_8
YC_3	1.000					
XC_1	0.468	1.000				
XC_2	0.541	0.189	1.000			
XC_5	0.621	0.200	0.505	1.000		
XC_7	0.839	0.566	0.544	0.622	1.000	
XC_8	0.388	0.069	0.049	0.179	0.259	1.000

10.

	YC_4	XC_6	XC_7	XC_8
YC_4	1.000			
XC_6	0.369	1.000		
XC_7	0.536	0.271	1.000	
XC_8	0.404	0.063	0.303	1.000

11.

	YC_5	XC_7
YC_5	1.000	
XC_7	0.452	1.000

12.

	YB_1	XB_1	XB_6
YB_1	1.000		
XB_1	0.205	1.000	
XB_6	0.591	0.119	1.000

13.

	YB_2	XB_1	XB_4	XB_6
YB_2	1.000			
XB_1	0.682	1.000		
XB_4	0.726	0.575	1.000	
XB_6	0.618	0.504	0.424	1.000

14.

	YB_3	XB_1	XB_2	XB_4	XB_5	XB_6
YB_3	1.000					
XB_1	0.273	1.000				
XB_2	0.472	0.001	1.000			
XB_4	0.527	0.211	0.489	1.000		
XB_5	0.595	0.253	0.399	0.674	1.000	
XB_6	0.622	0.119	0.284	0.734	0.659	1.000

15.

	YB_4	XB_1	XB_2	XB_6	XB_7
YB_4	1.000				
XB_1	0.622	1.000			
XB_2	0.724	0.424	1.000		
XB_6	0.401	0.150	0.296	1.000	
XB_7	0.732	0.504	0.575	0.364	1.000

16.

	YB_5	XB_7
YB_5	1.000	
XB_7	0.350	1.000

17.

	YV_1	XV_6	XV_7
YV_1	1.000		
XV_6	0.574	1.000	
XV_7	0.653	0.640	1.000

18.

	YV_3	XV_7
YV_3	1.000	
XV_7	0.719	1.000

19.

	YA_1	XA_5	XA_7
YA_1	1.000		
XA_5	0.613	1.000	
XA_7	0.675	0.575	1.000

20.

	YA_2	XA_7	XA_8
YA_2	1.000		
XA_7	0.670	1.000	
XA_8	0.666	0.588	1.000

21.

	YA_3	XA_5	XA_7	XA_8
YA_3	1.000			
XA_5	0.627	1.000		
XA_7	0.690	0.575	1.000	
XA_8	0.230	-0.010	0.120	1.000

22.

	YA_4	XA_1	XA_6	XA_7
YA_4	1.000			
XA_1	0.014	1.000		
XA_6	0.574	0.079	1.000	
XA_7	0.728	0.145	0.528	1.000

23.

	YA_5	XA_5
YA_5	1.000	
XA_5	0.490	1.000

6.3 SILK REELING INDUSTRY

The structural equations have been prepared on annual basis. The nomenclature to be used is as follows:

Y_1: Annual production of raw silk yarn in kg.

Y_2: Annual output of reeling sector in Rs. (Value of raw silk+value of silk waste).

Y_3: Annual Income of the reeling sector (in Rs.).

X_1: Cost of cocoon used in reeling sector (in Rs.).

X_2: Transport cost for the purchase of cocoon (in Rs.).

X_3: Hired labour cost for production of raw silk yarn (in Rs.).

X_4: Self employed labour cost for the production of raw silk yarn (in Rs.).

X_5: Fuel cost in reeling sector (in Rs.).

X_6: Fixed capital assets (in Rs.).

X_7: Transport cost incurred for sale of finished products (in Rs.).

The interpretation of the relationships obtained from regression analysis is as follows:

6.3.1 Production of Raw Silk Yarn in kg. : Structural Relations

Annual production of raw silk yarn (Y_1) in reeling sector has been regressed on cost of cocoon (X_1) and hired labour cost (X_3). Y_1 was also regressed on other variables like X_2, X_4, X_5, X_6 and X_7. But no significant influence of these variables on Y_1 were found, therefore, these variables are excluded from the regressed equation. For the annual production of reeling sector the regression equation so fitted is:

$$Y_1 = \underset{(14.377)}{46.403} + \underset{(.0001)}{.002X_1^{*}} - \underset{(.001)}{.005X_3^{*}} \qquad : R^2 = .97^{*}$$

R^2 being very high in this case depicts that the variables have provided a good fit for the relevant dependent variable.

The marginal contribution of X_1 and X_3 on Y_1 keeping other variables fixed are .002, -.005 respectively. The explained variation by the above regression is 97% of the total variation of Y_1. The variable X_1 has a positive influence on Y_1 whereas X_3 influences Y_1 negatively. Though the respective impacts are highly significant but are of very low values.

6.3.2 Annual Output (in Rs.) of Reeling Sector: Structural Relations

Annual output (Y_2) has been regressed on cost of cocoon (X_1), hired labour cost (X_3), fuel cost (X_5), fixed capital assets (X_6) and transport cost incurred for sale of the production (X_7). Y_2 was also regressed on other variables like X_2 and X_4; but no significant influences of the said variables on Y_2 were found. Therefore, these variables are excluded from the regressed equation. For the annual output of reeling sector the regression equation so fitted is:

$$Y_2 = \underset{(13768.0)}{9445.1} + \underset{(.118)}{.921X_1^{*}} - \underset{(1.187)}{2.472X_3^{**}} + \underset{(1.787)}{6.054X_5^{*}} + \underset{(.382)}{1.027X_6^{*}} + \underset{(21.941)}{53.83X_7^{*}} \qquad : R^2 = .97^{*}$$

R^2 being very high in this equation upholds that the variables conclusively explain the dependent variable in conformity with the maintained hypothesis.

The marginal contribution of X_1, X_3, X_5, X_6 and X_7 on Y_2 keeping other variables fixed are .921, 2.472, 6.054, 1.027, 53.83 respectively. The explained variation by the above regression is 97% of the total variation of Y_2. The variables X_1, X_5, X_6 and X_7 have a positive influence on Y_2, whereas X_3 has a negative influence on Y_2. The role of the individual explanatory variable is conveyed by the co-efficient associated with them. It can be seen that X_1 has a positive influence on Y_2 because good quality of cocoon produces good quality of raw silk yarn, which fetches better price in the market compared to low quality of raw silk produced.

6.3.3 Annual Income (in Rs.) of Reeling Unit: Structural Relations.

Annual income of the reeling sectors (Y_3) has been regressed on hired labour cost for production (X_3), fuel cost for production (X_5), fixed capital assets (X_6) and transport cost incurred for sale the production (X_7). Y_3 was also regressed on other variables (X_1, X_2 and X_4). But no significant influences of these variables on Y_3 were found; therefore, these variables are excluded from the regressed equation. For the annual income of the reeling sector the regression equation so fitted is:

$$Y_3 = \underset{(10421.0)}{2636.6} - \underset{(1.140)}{3.745}\overset{*}{X_3} + \underset{(1.519)}{4.207}\overset{*}{X_5} + \underset{(.389)}{.958}\overset{**}{X_6} + \underset{(21.834)}{54.293}\overset{**}{X_7} \qquad : R^2 = .73^{*}$$

The R^2 value in this equation is moderately high and speaks of the efficiency of the right hand side variables together in explaining the variation in the reeling sector.

The marginal contribution of X_3, X_5, X_6 and X_7 on Y_3 keeping other variables fixed are 3.745, 4.207, .958, 54.293 respectively. The explained variation by the above regression is 73% of the total variation of Y_3. The variables X_5, X_6 and X_7 have a positive influence on Y_3 whereas X_3 has a negative influence. These influences are in conformity with the maintained hypothesis. X_3 has a negative impact on annual output because hired labour worked for a definite period only. This leads to wastage of fuel. Besides their contribution in terms of productivity is low as the wage rate is high but labour efficiency is low. Higher fuel cost and higher fixed capital assets induce higher value added to product have a positive impact on annual output. High fuel cost is usually associated with long hours of operation by the self employed labour and use of high priced improved basin locally known as Reeling ghai (Ghosh basin) which can produce fine quality yarn of Tana and reeling varna types. These types of product procure a higher price in the market compared to the 'Kat varna' silk yarn produced by traditional Country Charkha basin. This requires a low fixed assets and also consume less fuel. X_7 has a very high positive influence on Y_3 as the rate of silk yarn in distant silk market places of Bangalore/Varanasi/Bhagalpur is very high. Though this will involve extra expenditure on transport but the net returns on output will be high.

Summary of stepwise linear regression of Y_1 (Production), Y_2 (Output) and Y_3 (Income) of the reeling industry are as follows:

1. $Y_1 = 46.403 + .00169X_1^{*} - .0048X_3^{*}$ $\qquad : R^2 = .97^{*}$
   (14.377) (.0001) (.0011)

2. $Y_2 = 9445.1 + .921X_1^{*} - .2472X_3^{**} + 6.053X_5^{*} + 1.027X_6^{*} + 53.830X_7^{**}$ $\qquad : R^2 = .97^{*}$
   (13768) (.118) (1.188) (1.787) (.382) (21.941)

3. $Y_3 = 2634.6 - 3.740X_3^{*} + 4.207X_5^{*} + .957X_6^{**} + 54.293X_7^{**}$ $\qquad : R^2 = .74^{*}$
   (10421) (1.140) (1.519) (.383) (21.834)

Figures in parenthesis are corresponding standard errors, and *, **, ***, indicate that the parameters are statistically significant at 1%, 5%, 10% level of significance respectively for (n-p-1) degrees of freedom. Where n represents the number of observations and p represents the number of explanatory variables.

Optimum functional models of Y_1 (Production), Y_2 (Output) and Y_3 (Income) of the reeling sector are as follows:

1. $Y_1 = f\,(X_1$ and $X_3)$.

$Y_2 = f\,(X_1, X_3, X_5, X_6$ and $X_7)$.

$Y_3 = f\,(X_3, X_5, X_6$ and $X_7)$.

Correlations Co-efficient Matrix of dependent and explanatory variables of reeling sector are as follows:

1.

	Y_1	X_1	X_3
Y_1	1.000		
X_1	0.997	1.000	
X_3	0.985	0.994	1.000

2.

	Y_2	X_1	X_3	X_5	X_6	X_7
Y_2	1.000					
X_1	0.998	1.000				
X_3	0.993	0.994	1.000			
X_5	0.996	0.995	0.995	1.000		
X_6	0.882	0.874	0.886	0.867	1.000	
X_7	0.969	0.964	0.963	0.963	0.865	1.000

3.

	Y_3	X_3	X_5	X_6	X_7
Y_3	1.000				
X_3	0.711	1.000			
X_5	0.735	0.995	1.000		
X_6	0.725	0.886	0.867	1.000	
X_7	0.779	0.963	0.963	0.865	1.000

6.4 TWISTING SECTOR

The nomenclature used in the structural equation is as follows:

Y_1: Production of twisted yarn (in kg.).

Y_2: Annual total output of twisting sector (in Rs.).

Y_3: Annual Income of the twisting sector (in Rs.).

X_1: Cost of raw silk yarn (in Rs.).

X_2: Labour cost (in Rs.).

X_3: Fuel cost (in Rs.).

X_4: Maintenance cost of machine (in Rs.).

X_5: Fixed capital assets (in Rs.).

X_6: Transport cost for sale of the finished products (in Rs.).

The structural equation explaining several policy variables are obtained from least squares analysis for the twisting industry are given below:

6.4.1 Production (in kg.) of Twisted Yarn: Structural Relations:

Annual production of twisted yarn (Y_1) has been regressed on the cost of raw silk yarn (X_1), labour cost (X_2), Fuel cost (X_3) and fixed capital assets (X_5). Y_1 was regressed on X_4 and X_6, but no significant influence of these variables on Y_1 was found. Hence, the said variables are excluded from the regressed equation. The regression equation so estimated is:

$$Y_1 = \underset{(428.37)}{278.65} + \underset{(.00027)}{.00056X_1^{**}} + \underset{(.0080)}{.0045X_2^{*}} - \underset{(.0038)}{.00023X_3^{*}} + \underset{(.0012)}{.00110X_5^{*}} \qquad : R^2 = .90^{*}$$

R^2 is very high in this equation, which depicts that the explanatory variables have provided a good fit for the relevant dependent variable.

The marginal contribution of X_1, X_2, X_3 and X_5 on Y_1 keeping other variables fixed are .00056, .0045, -.00023, .00110 respectively. The explained variation by the above regression is 90% of the total variation of Y_1. The variables X_1, X_2 and X_5 have a positive influence on Y_1 but the magnitude of each co-efficient is exceptionally low. Whereas X_3 has a negative influence on Y_1 but that is also very insignificant.

6.4.2 Annual Output (in Rs.) of Twisting Sector: Structural Relations.

Annual output of the twisting sector (Y_2) has been regressed on cost of raw silk yarn (X_1), fuel cost (X_3), maintenance cost of machine (X_4) and fixed capital assets (X_5). Y_2 was also regressed on other variables (X_2, X_6) but no significant influences of these variables on Y_2 were found, therefore, these variables are excluded from the regressed equation. The regression equation so fitted is:

$$Y_2 = \underset{(531.66)}{19.15} + \underset{(.0002)}{.002X_1^{*}} - \underset{(.005)}{.012X_3^{**}} + \underset{(.056)}{.170X_4^{*}} + \underset{(.001)}{.0041X_5^{*}} \qquad : R^2 = .96^{*}$$

It is evident from the equation that R^2 being sufficiently high depicts that the policy variables conclusively explain the dependent variable in conformity with the maintained hypothesis. The explained variation by the above regression is 96% of the total variation of Y_2. The role of the individual explanatory variable is conveyed by the co-efficient associated with them. The variables X_1, X_4 and X_5 have a positive influence on Y_2 but their impacts are of low magnitude. X_3 has a negative influence on Y_2 and its decreasing impact is very low. It can be seen that fuel cost has a negative impact on Y_2. Most of the twisting units of Malda have high idle capacity. But these units have to pay special levy charges for electric connection per month. Naturally this has an adverse impact on production.

6.4.3 Income (in Rs.) of the Twisting Sector: Structural Relations.

Annual income of the twisting sector (Y_3) has been regressed on cost of raw silk yarn (X_1) and cost of labour (X_2). Y_3 was also regressed on other variables like X_3, X_4, X_5, X_6, X_7 and X_8, but no significant influence of these said variables on Y_3 were found, therefore, these variables are excluded from the regressed equation. The regression equation so fitted is:

$$Y_3 = 2502.1 + .148\overset{**}{X_1} + .072\overset{**}{X_2} \qquad : R^2 = .72^{*}$$
$$(131260.0)\ (.064)\quad (2.109)$$

R^2 being only moderately high in this equation depicts that the explanatory variables have provided a moderately good fit for the relevant dependent variable.

The marginal contribution of X_1 and X_2 on Y_3 keeping other variables fixed are .148 and .072. The explained variation by the above regression is 72% of the total variation of Y_3. Both of the independent variables X_1 and X_2 have a positive influence on Y_3, which is in accordance with the maintained hypothesis. However, the impact of X_2 on Y_2 is of an insignificant nature.

Summary of stepwise linear regression of Y_1 (Production), Y_2 (Output) and Y_3 (Income) of the twisting sector are as follows:

1. $Y_1 = 278.65 + .00056X_1^{**} + .0045X_2^{*} - .00023X_3^{*} + .0011X_5^{**}$: $R^2 = .90^{*}$

(428.37) (.00027) (.0080) (.0038) (.0012)

2. $Y_2 = 19.15 + .002X_1^{*} + .012X_3^{**} + .170X_4^{*} + .004X_5^{*}$: $R^2 = .96^{*}$

(531.66) (.0002) (.005) (.056) (.001)

3. $Y_3 = 2502.1 + .148X_1^{**} + .072X_2^{*}$: $R^2 = .72^{*}$

(.0000001) (.064) (2.10)

Figures in parenthesis are corresponding standard errors, and *, **, ***, indicate that the parameters are statistically significant at 1%, 5%, 10% level of significance respectively for (n-p-1) degrees of freedom. Where n represents the number of observations and p represents the number of explanatory variables.

Optimum functional models of Y_1 (Production), Y_2 (Output) and Y_3 (Income) in twisting sector are as follows.

$Y_1 = f$ (X_1, X_2, X_3 and X_5).

$Y_2 = f$ (X_1, X_3, X_4 and X_5).

$Y_3 = f$ (X_1 and X_2).

Correlation Co-efficient Matrix of dependent and explanatory variables in the twisting sector are as follows:

1.

	Y_1	X_1	X_2	X_3	X_5
Y_1	1.000				
X_1	0.908	1.000			
X_2	0.874	0.829	1.000		
X_3	0.519	0.470	0.344	1.000	
X_5	0.415	0.167	0.427	0.570	1.000

2.

	Y_2	X_1	X_3	X_4	X_5
Y_2	1.000				
X_1	0.935	1.000			
X_3	0.433	0.704	1.000		
X_4	0.357	0.202	0.273	1.000	
X_5	0.304	0.167	0.570	0.078	1.000

3.

	Y_3	X_1	X_2
Y_3	1.000		
X_1	0.847	1.000	
X_2	0.706	0.828	1.000

6.5 WEAVING SECTOR

The Structural equation has been prepared on annual basis. The nomenclature to be used is as follows:

Y_1= Production of silk than (in Rs.).

Y_2= Total output (value of silk than+silk waste) in Rs.

Y_3= Income of the weaving sector (in Rs.).

X_1= Cost of raw silk yarn (in Rs.).

X_2= Labour cost (in Rs.).

X_3= Fuel cost (in Rs.).

X_4= Maintenance cost of machine (in Rs.).

X_5= Depreciation charges of the machine (in Rs.).

X_6= Depreciation charges of the Building (in Rs.).

X_7= Interest on Banking loan (in Rs.).

X_8= Interest on own Working Capital (in Rs.).

X_9= Printing cost of Silk Than (in Rs.).

X_{10}=Transport cost for sale of finished products (in Rs.).

X_{11}=Fixed capital assets (in Rs.).

Structural equation explaining several policy variables are obtained from least squares analysis for the Weaving Industry are given below:

6.5.1. Production of Silk Than (in Rs.):

Production of silk than (Y_1) has been regressed on cost of raw silk yarn (X_1), and fixed capital assets (X_{11}). Y_1 was also regressed on other variables (X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9 and X_{10}) but no significant influences of these variables on Y_1 were found. Therefore, these variables are excluded from the regressed equation. The regression equation so fitted is:

$$Y_1 = -1952.2 + .0232X_1^{*} + .0168X_{11}^{*} \qquad :R^2 = .98^{*}$$
$$(839.80) \quad (.0027) \quad (.0063)$$

It is evident from the equation that R^2 is very high indicating the capacity of the variables to explain the dependent variable in conformity with the maintained hypothesis.

The marginal contribution of X_1 and X_{11} on Y_1 keeping other variables fixed are .0232 and .0168 respectively. The explained variation by the above regression is 97% of the total variation of Y_1. Both the variations X_1 and X_{11} have a positive influence on Y_1. However, these influences are of a low magnitude.

6.5.2. Total Output in Rs.:

Annual output of weaving sector (Y_2) has been regressed on cost of raw silk yarn (X_1), labour cost (X_2) and fixed capital assets (X_{11}). Y_2 was regressed on other variables like X_3, X_4, X_5, X_6, X_7, X_8, X_9 and X_{10}; but no significant influences were found, therefore, these variables are excluded from the regressed equation. The regression equation so fitted is:

$$Y_2 = -209700.00 + 2.007X_1^{*} - 5.121X_2^{**} + 1.721X_{11}^{*} \qquad :R^2 = .97^{*}$$
$$(64767) \quad (.504) \quad (2.461) \quad (.469)$$

R^2 being high in the above equation, which depicts that, the variables provide a good fit for the relevant dependent variables.

The marginal contribution of X_1, X_2 and X_{11} on Y_2 keeping other variables fixed are 2.007, -5.121, 1.721 respectively. The explained variation by the above regression is 97% of the total variation of Y_2. The variables X_1 and X_{11} have a positive influence on Y_2 whereas X_2 has a negative influence on Y_2. Malda district is practically devoid of efficient and experienced weavers. Units have to depend on outside weavers whose wage rate is very high. Either for the inefficient local weaver or due to the very high wage rate of the efficient weavers, value added in manufacture is very low. This explains the high negative influence of X_2 on production while raw material cost and fixed capital, influences production positively, which is in conformity with the maintained hypothesis.

6.5.3 Income (in Rs.) of the Weaving Sector:

Annual income of the weaving sector (Y_3) has been regressed on cost of raw silk yarn (X_1), labour cost (X_2) and fixed capital assets (X_{11}). Y_3 was also regressed on other variables (X_3, X_4, X_5, X_6, X_7, X_8, X_9 and X_{10}) but no significant influences of these variables on Y_3 were found, therefore, these variables are excluded from the regressed equation. The regression equation so fitted is:

$$Y_3 = -\underset{(69655)}{224790.00} + \underset{(.442)}{.966}\overset{**}{X_1} - \underset{(2.647)}{6.526}\overset{**}{X_2} + \underset{(.504)}{1.700}\overset{*}{X_{11}} \qquad : R^2 = .7\overset{*}{5}$$

R^2 being moderately high in this above equation and depicts that the variables conclusively explained the dependent variable in conformity with the maintained hypothesis.

The marginal contribution of X_1, X_2 and X_{11} on Y_3 keeping other variables fixed are .966, -6.526, 1.700 respectively. The explained variation by the above regression is 75% of the total variation of Y_3. The variables X_1 and X_{11} have a positive influence on Y_3. Whereas X_2 has a negative influence on Y_3 and their magnitude is as high as Rs. 6.526.

Summary of stepwise linear regression of Y_1 (Production), Y_2 (Output) and Y_3 (Income) of the weaving sector are as follows:

1. $Y_1 = -1952.2 + .0232X_1^{*} + .0168X_{11}^{*}$: $R^2 = .98^{*}$

(839.8) (.0027) (.0063)

2. $Y_2 = -209900.00 + 2.007X_1^{*} - 5.120X_2^{*} + 1.721X_{11}^{*}$: $R^2 = .97^{*}$

(64767) (.504) (2.461) (.469)

3. $Y_3 = -224790.00 + .966X_1^{**} - 6.526X_2^{**} + 1.700X_{11}^{*}$: $R^2 = .75^{*}$

(69655) (.442) (2.647) (.504)

Figures in parenthesis are corresponding standard errors, and *, **, ***, indicate that the parameters are statistically significant at 1%, 5%, 10% level of significance respectively for (n-p-1) degrees of freedom. Where n represents the number of observations and p represents the number of explanatory variables.

Optimum functional models of Y_1 (Production), Y_2 (Output), Y_3 (Income) in weaving sector are as follows:

$Y_1 = f$ (X_1 and X_{11}).

$Y_2 = f$ (X_1, X_2 and X_{11}).

$Y_3 = f$ (X_1, X_2 and X_{11}).

Correlations Co-efficient Matrix of dependent and explanatory variables in weaving sector are as follows:

1.

	Y_1	X_1	X_{11}
Y_1	1.000		
X_1	0.986	1.000	
X_{11}	0.914	0.867	1.000

2.

	Y_2	X_1	X_2	X_{11}
Y_2	1.000			
X_1	0.964	1.000		
X_2	0.935	0.982	1.000	
X_{11}	0.929	0.867	0.880	1.000

3.

	Y_3	X_1	X_2	X_{11}
Y_2	1.000			
X_1	0.440	1.000		
X_2	0.374	0.982	1.000	
X_{11}	0.661	0.867	0.880	1.000

6.6 Conclusion:

The structural relationship among different variables as discussed in this chapter has implications in generating income in various pre and post cocoon sectors. Each structural equation of different sectors of sericulture and silk industry describes a subsystem in which the regressed variable is structurally dependent on or determined by a set of policy variables. These structural equations have been interpreted in terms of their economic meaning. These with regards to the planning implications, the relationship, among different (impact and policy) variables are of great importance. They could be used for estimating the responses of a dependent variable to changes in independent variables due to planning decision. Fruitful use of various significant independent variables for the formulation of relevant policy framework for the development of sericulture and silk industry has been taken up in next chapter.