Chapter 6

Result and Discussion

This chapter deals with the results of the study or investigation discussed about it. At the end of this chapter interpretation has been made, explanation has been tried to put down and an attempt has been made to reveal the cause behind it.

Table 6.1: Descriptive statistics of Independent Variables (X_1-X_{19}) in terms of Range, Mean, Standard deviation and Coefficient of variation

N = 100

SL. NO.	VARIABLES	Minimum	Maximum	Mean	SD	CV (%)
1	Age(X1)	23	82	51	11.30	22.03
2	Education(X2)	1	19	7.17	3.65	50.71
3	Gender ratio(X3)	0.25	4	1.42	0.85	59.53
4	Family size(X4)	1	15	5.07	2.57	50.46
5	Family education status(X5)	1	15	7.25	2.31	31.66

6	Innovation index(X6)	2000	90000	14271.57	18138.29	126.46
7	Occupation(X7)	5	7.9	6.12	0.82	13.33
8	Family MIS(X8)	1	7.1	2.66	1.19	44.52
9	Cropping intensity(X9)	100	2633	237.62	253.19	106.02
10	Farm size(X10)	4	510	74.57	65.15	86.93
11	Expenditure allotment(X11)	22.4	48.3	35.45	7.06	19.80
12	Credit load(X12)	1000	20000	3242.50	3179.28	97.56
13	Annual income(X13)	14000	230000	53119.31	39453.00	73.90
14	Irrigation index(X14)	0.086	0.96	0.78	0.21	26.20
15	Crop diversity index(X15)	0.003	0.33	0.04	0.07	176.92
16	Crop energy productivity (X16)	9.48	258.96	68.77	61.63	89.62
17	Adoption	1	3.3	1.70	0.59	34.46

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	index(X17)					
18	Size of water body(X18)	0	1500	70.86	180.70	253.74
19	Cattle holding economics(X19)	950	35000	9535.90	8395.43	88.04

Table 6.1 presents the distribution of independent variables (X_1-X_{19}) in terms of range, mean, standard deviation, and coefficient of variation.

It has been found from the study that for the independent variable, **Age (X_1)**, the maximum is of 82 years, and the minimum is of 23 years. The mean age group was found, 51 years with the standard deviation, 11.30 for the total distribution taken for the study. Coefficient of variation of this variable is 22.03 per cent, which shows that the level of consistency in the distribution of age is high.

The independent variable, **Education (X_2),** of farmer has been found to be the minimum score 1 (primary school) and the maximum score 19 (post-graduation). The mean education has been found, 7.17 with the standard deviation, 3.65 for the total distribution taken for the study. This independent variable has shown coefficient of variation 50.71 per cent which infers that the medium level of consistency in its distribution.

The independent variable, **Gender ratio (X_3),** has been found to be the minimum 0.25 and the maximum 4. The mean and the standard deviation of this independent variable are 1.42, and 0.85 respectively for the total distribution taken for the study. The coefficient of variation of this variable is 59.53 per cent showing the medium level of consistency in its distribution.

The independent variable, **Family size (X_4),** has been found to be the minimum score 1, and the maximum score 15. The mean and the standard deviation of this independent variable are 5.07, and 2.57 respectively for the total distribution taken for the study. The coefficient of variation of this

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variable is 50.46 per cent which shows the medium level of consistency in its distribution.

The independent variable, **Family education status (X_5),** has been found to be the minimum score 1 (primary school) and the maximum score 15 (post graduation level). The mean of this variable is 7.25 with the standard deviation 2.31 for the total distribution taken for the study. The coefficient of variation of this variable is 31.66 per cent which shows the high level of consistency in its distribution.

The independent variable, **Innovation index (X_6),** has been found to be the minimum 2000 and the maximum 90000. The mean and the standard deviation of this independent variable are 14271.57, and 18138.29 respectively for the total distribution taken for the study. The coefficient of variation of this variable is 126.46 per cent showing the low level of consistency in its distribution.

The independent variable, **Occupation (X_7),** has been found to be the minimum score 5 showing priority for the business, and the maximum score 7.9 showing priority for the service. The mean score of this independent variable is 6.12, and the standard deviation is 0.82 for the total distribution taken for the study. The coefficient of variation is 13.33 per cent which shows the high level of consistency in its distribution.

The independent variable, **Family MIS (X_8),** has been found to be the minimum score 1 showing priority for the business, and the maximum score 7.1 showing priority for the service. The mean score of this independent variable is 2.66, and the standard deviation is 1.19 for the total distribution taken for the study. The coefficient of variation is 44.52 per cent which shows the high level of consistency in its distribution.

The independent variable, **cropping intensity (X_9),** has been found to be the minimum 100 per cent and the maximum 2633 per cent. The mean score of this variable is 237.62, and the standard deviation is 253.19 for the total distribution taken for the study. The coefficient of variation is 106.02 per cent which shows the low level of consistency in its distribution.

The independent variable, **Farm size (X_{10}),** has been found to be the minimum 4 decimal and the maximum 510 decimal. The mean and the standard deviation of this independent variable are 74.57, and 65.15 respectively for the total distribution taken for the study. The coefficient of variation is 86.93 per cent which shows the medium level of consistency in its distribution.

The independent variable, **Expenditure allotment (X_{11}),** has been found to be the minimum 22.4 per cent and, the maximum 48.3 per cent. The mean and the standard deviation of this independent variable are 35.45, and 7.06 respectively for the total distribution taken for the study. The coefficient of variation is 19.80 per cent which shows the high level of consistency in its distribution.

The independent variable, **Credit load (X_{12}),** has been found to be the minimum 1000 rupees and the maximum 20000 rupees per annum in agriculture. This independent variable has the mean score 3242.50, and the standard deviation is 3179.28 for the total distribution taken for the study. The coefficient of variation is 97.56 per cent which shows the medium level of consistency in its distribution.

The independent variable, **Annual income (X_{13}),** has been found to be the minimum 14000, and the maximum 230000 per annum. This variable has the mean value 53119.31 and the standard deviation has 39453.00 for the total distribution taken for the study. The coefficient of variation is 73.90 per cent which shows medium level of consistency in its distribution.

The independent variable, **Irrigation index (X_{14}),** has been found to be the minimum 0.086 and the maximum 0.96 (ratio). The mean value of this variable is 0.78 and the standard deviation is 0.21 for the total distribution taken for the study. The coefficient of variation of this variable is 26.20, showing that this variable has got the very high level of consistency.

The independent variable, **Crop Diversity Index (X_{15}),** has been found to be the minimum 0.003 and the maximum 0.33. The mean score of this variable is 0.04 and the standard deviation is 0.07 for the total distribution taken for the study. The coefficient of variation is 176.92 per cent which shows the low level of consistency in nature.

The independent variable, **Crop energy productivity (X_{16}),** has been found to be the minimum 9.48 and the maximum 258.96 (mega joule). The mean value of this variable is 68.77 and the standard deviation is 61.63 for the total distribution taken for the study. The coefficient of variation of this variable is 89.62, showing that this variable has got the medium level of consistency.

The independent variable, **Adoption Index (X_{17}),** has been found to be the minimum 1 and the maximum 3.3. The mean value of this variable is 1.70 and the standard deviation 0.59for the total distribution taken for the study. The coefficient of variation of this variable is 34.46 per cent which indicate that this variable has got the high level of consistency.

The independent variable, **Size of water body(X_{18}),** has been found to be the minimum 0 and the maximum 1500(decimal). The mean value of this variable is 70.86 and the standard deviation is 180.70 for the total distribution taken for the study. The coefficient of variation of this variable is 253.74, showing that this variable has got the very low level of consistency.

The independent variable, **Cattle holding economics(X_{19}),** has been found to be the minimum 950 and the maximum 3500 (rupees per cattle). The mean value of this variable is 9535.90 and the standard deviation is 8395.43 for the total distribution taken for the study. The coefficient of variation of this variable is 88.04, showing that this variable has got the very low level of consistency.

Table 6.2: Descriptive statistics of dependent variables (Y_1-Y_6) with respected to Mean, Standard Deviation and Co-efficient of variance values

N = 100

Sl. No	**VARIABLES**	**Minimum**	**Maximum**	**Mean**	**SD**	**CV (%)**
1	Cattle energy balance (Y1)	5460	7512	6470.52	478.16	7.39
2	Energy equivalence of cowdung (Y2)	11	135	43.13	28.23	65.13

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3	Crop energy metabolism (Y3)	-62.48	-0.68	-4.24	8.50	-200.47
4	Energy consumption in farm family (Y4)	0.07	0.67	0.34	0.22	64.70
5	Perceived impact on energy consumption (Y5)	5.85	8.1	6.79	0.59	8.72
6	Farmer's energy metabolism (Y6)	98025	184565	142550.45	23265.73	16.32

Table 6.2 presents the distribution of dependent variables (Y_1-Y_6) in terms of range, mean, standard deviation, and coefficient of variation.

The dependent variable, **Cattle energy balance (Y_1),** has been found to be the minimum 5460 (mega joule) and the maximum 7512 (mega joule). The mean value of this variable is 6470.52 and the standard deviation 478.16 for the total distribution taken for the study. The coefficient of variation of this variable is 7.39 per cent which show that the variable has got the very high level of consistency.

The dependent variable, **Energy equivalence of cow dung (Y_2),** has been found to be the minimum 11 (mega joule) and the maximum 135 (mega joule). The mean value of this variable is 43.13 and the standard deviation 28.23 for the total distribution taken for the study. The coefficient of variation of this variable is 65.13 per cent which show that the variable has got the very high level of consistency.

The dependent variable, **Crop energy metabolism (Y_3),** has been found to be the minimum -62.48 and the maximum -0.68. The mean value of this variable is -4.24 and the standard deviation is 8.50 for the total distribution taken for the study. The coefficient of variation of this variable is -200.47 per cent which shows that the variable has got the very low level of consistency.

The dependent variable, **Energy consumption in farm family (Y_4),** has been found to be the minimum 0.07 and the maximum 0.67. The mean value of this variable is 0.34 and the standard deviation is 0.22 for the total distribution taken for the study. The coefficient of variation of this variable is 64.70 per cent which shows that the variable has got the medium level of consistency.

The dependent variable, **Perceived impact on energy consumption (Y_5),** has been found to be the minimum 5.85 and the maximum 8.1. The mean value of this variable is 6.79 and the standard deviation is 0.59 for the total distribution taken for the study. The coefficient of variation of this variable is 8.27 per cent which shows that the variable has got very high level of consistency.

The dependent variable, **Farmer's energy metabolism (Y_6),** has been found to be the minimum 98025 (kilo joule) and the maximum 184565 (kilo joule). The mean value of this variable is 142550.45 and the standard deviation is 23265.73 for the total distribution taken for the study. The coefficient of variation of this variable is 16.32 per cent which shows that the variable has got very high level of consistency.

Table 6.3: Coefficient of correlation (r) between Cattle Energy Balance (Y_1) and 19 independent variables (X_1-X_{19})

			N = 100
SL. NO.	**VARIABLES**	**r VALUE**	**REMARKS**
1	AGE(X1)	0.115	
2	EDUCATION(X2)	-0.051	
3	GENDER RATIO(X3)	**-0.198**	**
4	FAMILY SIZE(X4)	-0.102	
5	FAMILY EDUCATION STATUS(X5)	-0.003	

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6	INNOVATION INDEX(X6)	0.008	
7	OCCUPATION(X7)	**0.375**	***
8	FAMILY MIS(X8)	-0.032	
9	CROPPING INTENSITY(X9)	-0.079	
10	FARM SIZE(X10)	0.067	
11	EXPENDITURE ALLOTEMENT(X11)	0.077	
12	CREDIT LOAD(X12)	-0.052	
13	ANNUAL INCOME(X13)	0.050	
14	IRRIGATION INDEX(X14)	0.140	
15	CROP DIVERSITY INDEX(X15)	0.023	
16	CROP ENERGY PRODUCTIVITY (X16)	0.072	
17	ADOPTION INDEX(X17)	0.018	
18	SIZE OF WATER BODY(X18)	-0.097	
19	CATTLE HOLDING ECONOMICS (X19)	0.122	

*** =r>0.167 significant at 10% level of significance **= r>0.197 significant at 5% level of significance ***= r>0.258 significant at 1% level of significance**

Results: - Table 6.3 presents the coefficient of correlation between cattle energy balance (Y_1) and 19 independent variables (X_1-X_{19}). It has been found that the variable Gender Ratio (X_3) has recorded significant relationship at 5% level of significance, and the variable Occupation (X_7) has recorded a significant correlation at 10% level with the dependent variable cattle energy balance (Y_1).

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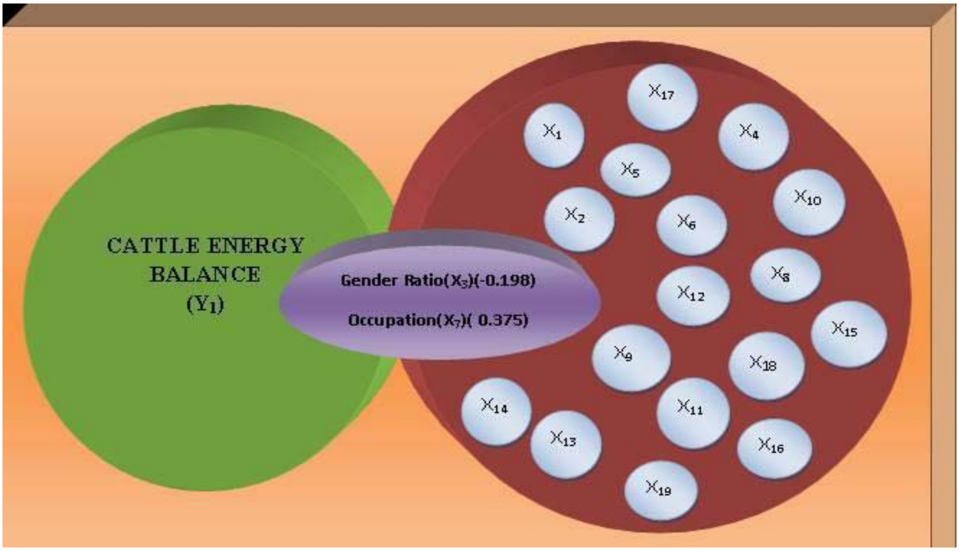
MODEL - 6.1



Revelation: **-** The model-6.1 shows that with higher level of gender vis-à-vis women participation has helped better cattle energy management and higher proficiency as well the livestock management because of their very nature, merit, demand and more participation from women folk.

The very nature and function of the occupation of respondents have performed here belligerently for managing cattle energy balance in a decisive manner. It is the occupation which governs the life processes and it is the life processes which are entitled naturally and elegantly with cattle energy balances. Some respondents who are occupationally livestock raiser and having some proportion of modernization, can manage the energy with higher proficiency as well as productivity.

Table no 6.4 Coefficient of correlation (r) between Energy Equivalence of cow dung (Y_2) and 19 independent variables (X_1-X_{19})

			N = 100
SL. NO.	**VARIABLES**	**r VALUE**	**REMARKS**
1	AGE(X1)	0.008	

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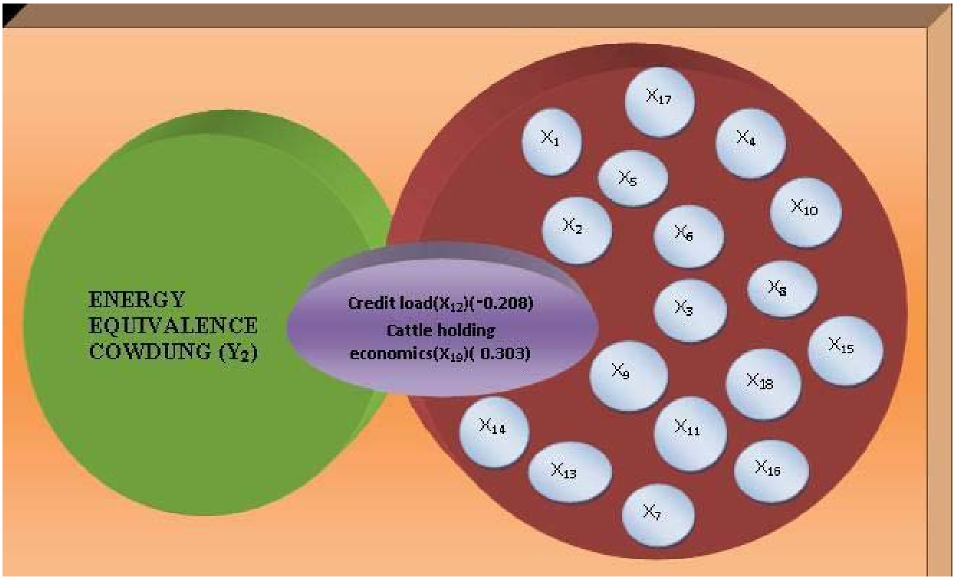
2	EDUCATION(X2)	0.011	
3	GENDER RATIO(X3)	-0.063	
4	FAMILY SIZE(X4)	0.019	
5	FAMILY EDUCATION STATUS(X5)	-0.020	
6	INNOVATION INDEX(X6)	0.028	
7	OCCUPATION(X7)	-0.163	
8	FAMILY MIS(X8)	0.077	
9	CROPPING INTENSITY(X9)	-0.074	
10	FARM SIZE(X10)	0.053	
11	EXPENDITURE ALLOTEMENT(X11)	-0.090	
12	CREDIT LOAD(X12)	**-0.208**	**
13	ANNUAL INCOME(X13)	0.115	
14	IRRIGATION INDEX(X14)	0.073	
15	CROP DIVERSITY INDEX(X15)	-0.051	
16	CROP ENERGY PRODUCTIVITY(X16)	0.048	
17	ADOPTION INDEX(X17)	0.072	

18	SIZE OF WATER BODY(X18)	-0.142	
19	CATTLE HOLDING ECONOMICS(X19)	**0.303**	***

*** =r>0.167 significant at 10% level of significance **= r>0.197 significant at 5% level of significance ***= r>0.258 significant at 1% level of significance**

Results: - Table 6.4 presents the coefficient of correlation between Energy Equivalence of cow dung (Y_2) and 19 independent variables (X_1-X_{19}). It has been found that the variable Cattle holding economics (X_{19}) has recorded significant relationship at 1% level of significance, and the variable Credit load (X_{12}) has recorded a significant correlation at 5% level with the dependent variable Energy Equivalence of cow dung (Y_2).

MODEL - 6.2



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Revelation: - The model-6.2 shows that the average livestock entrepreneurs, being supported by institutional credit, have been motivated with economic motivation and repayment drive and bestowed the above relationship; and this has also been supported by cattle holding status.

Table 6.5 Coefficient of correlation (r) between Crop Energy Metabolism (Y_3) and 19 independent variables (X_1-X_{19})

			N = 100
SL. NO.	VARIABLES	r VALUE	REMARKS
1	AGE(X1)	**0.237**	**
2	EDUCATION(X2)	0.024	
3	GENDER RATIO(X3)	0.131	
4	FAMILY SIZE(X4)	-0.043	
5	FAMILY EDUCATION STATUS(X5)	0.049	
6	INNOVATION INDEX(X6)	-0.123	
7	OCCUPATION(X7)	-0.020	
8	FAMILY MIS(X8)	-0.053	
9	CROPPING INTENSITY(X9)	0.001	
10	FARM SIZE(X10)	0.088	
11	EXPENDITURE ALLOTEMENT(X11)	-0.060	

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12	CREDIT LOAD(X12)	-0.021	
13	ANNUAL INCOME(X13)	0.115	
14	IRRIGATION INDEX(X14)	0.073	
15	CROP DIVERSITY INDEX(X15)	-0.051	
16	CROP ENERGY PRODUCTIVITY(X16)	0.048	
17	ADOPTION INDEX(X17)	0.072	
18	SIZE OF WATER BODY(X18)	-0.142	
19	CATTLE HOLDING ECONOMICS(X19)	0.114	

*** =r>0.167 significant at 10% level of significance **= r>0.197 significant at 5% level of significance ***= r>0.258 significant at 1% level of significance**

Results: - Table 6.5 presents the coefficient of correlation between Crop Energy Metabolism (Y_3) and 19 independent variables (X_1-X_{19}). It has been found that the variable Age (X_1) has recorded a significant correlation at 5% level with the dependent variable Crop Energy Metabolism (Y_3).

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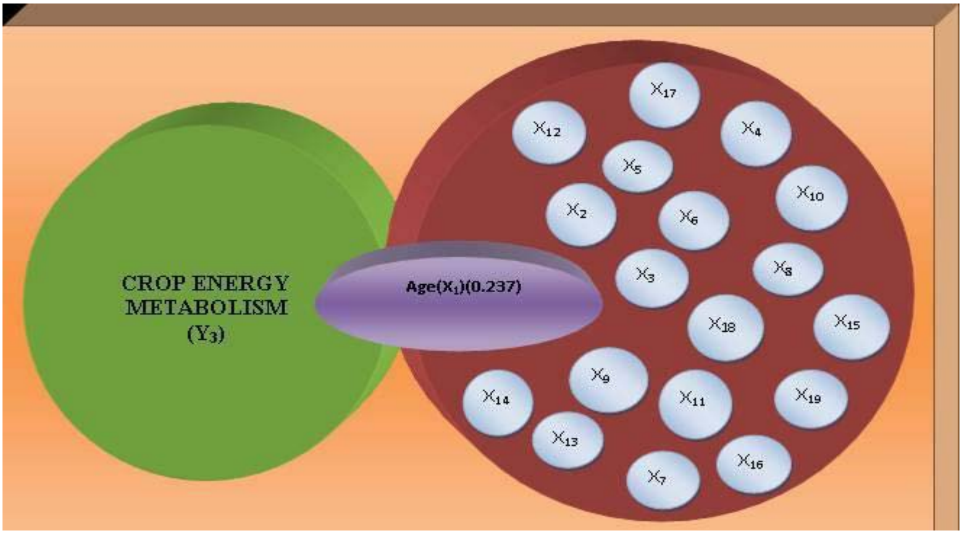
MODEL - 6.3



Revelation: - The model-6.3 shows that the experienced farmers who have been farming for so many years have a comparative edge over the young new generation farmers who are opting for rampant modernization without thinking of the energy balances that could increase the entropy level in the small farm ecology and add to already increasing ecological imbalances, that could decrease overall productivity in agriculture. So, experience (age) may be a positive step in giving the direction to all increasing global crisis of energy imbalances and ultimately to global warming.

Table no 6.6 Coefficient of correlation (r) between Energy Consumption in Farm Family (Y_4) and 19 independent variables (X_1-X_{19})

			N = 100
SL. NO.	**VARIABLES**	**r VALUE**	**REMARKS**
1	AGE(X1)	**-0.173**	*
2	EDUCATION(X2)	0.138	

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3	GENDER RATIO(X3)	-0.068	
4	FAMILY SIZE(X4)	0.027	
5	FAMILY EDUCATION STATUS(X5)	0.001	
6	INNOVATION INDEX(X6)	-0.035	
7	OCCUPATION(X7)	0.116	
8	FAMILY MIS(X8)	0.018	
9	CROPPING INTENSITY(X9)	-0.070	
10	FARM SIZE(X10)	0.136	
11	EXPENDITURE ALLOTEMENT(X11)	0.025	
12	CREDIT LOAD(X12)	0.118	
13	ANNUAL INCOME(X13)	0.060	
14	IRRIGATION INDEX(X14)	0.032	
15	CROP DIVERSITY INDEX(X15)	**0.186**	*
16	CROP ENERGY PRODUCTIVITY(X16)	-0.004	
17	ADOPTION INDEX(X17)	-0.047	
18	SIZE OF WATER BODY(X18)	0.084	

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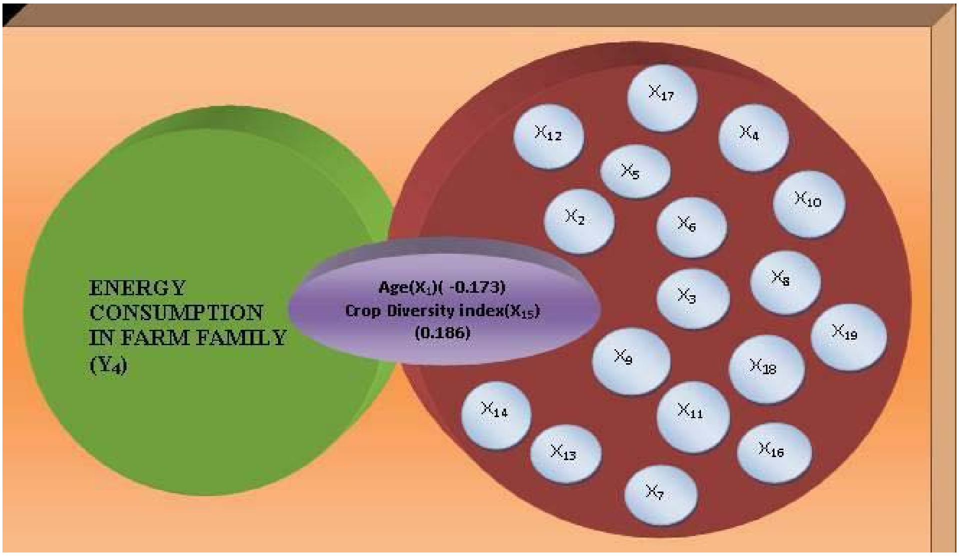
19	CATTLE HOLDING ECONOMICS(X19)	0.116	

*** =r>0.167 significant at 10% level of significance **= r>0.197 significant at 5% level of significance ***= r>0.258 significant at 1% level of significance**

Results: - Table 6.6 presents the coefficient of correlation between Energy Consumption in Farm Family (Y_4) and 19 independent variables (X_1-X_{19}). It has been found that the variable Age (X_1) and Crop diversity index (X_{15}) has recorded a significant correlation at 10% level with the dependent variable Energy Consumption in Farm Family (Y_4).

MODEL - 6.4



Revelation: -The model-6.4 clearly reveals that the younger generations nowadays having access to modern education and technological knowhow have higher levels of energy consumption in the form of modern gadgets like mobile phones laptops, motor bikes, coloured TV etc as compared to older people.

Also more the diversity of the crops on small farm holdings in order to get higher production intensive farming in the form of higher doses of fertilizers, pesticides, irrigation intensity etc, the more has scaled up the overall energy consumption.

Table No 6.7 Coefficient of correlation (r) between Perceived Impact on Energy Consumption (Y_5) and 19 independent variables (X_1-X_{19})

			N = 100
SL. NO.	**VARIABLES**	**r VALUE**	**REMARKS**
1	AGE(X1)	0.034	
2	EDUCATION(X2)	-0.028	
3	GENDER RATIO(X3)	0.060	
4	FAMILY SIZE(X4)	-0.083	
5	FAMILY EDUCATION STATUS(X5)	0.029	
6	INNOVATION INDEX(X6)	0.117	
7	OCCUPATION(X7)	**-0.178**	*
8	FAMILY MIS(X8)	0.082	
9	CROPPING INTENSITY(X9)	0.099	
10	FARM SIZE(X10)	0.149	
11	EXPENDITURE ALLOTEMENT(X11)	**-0.169**	*

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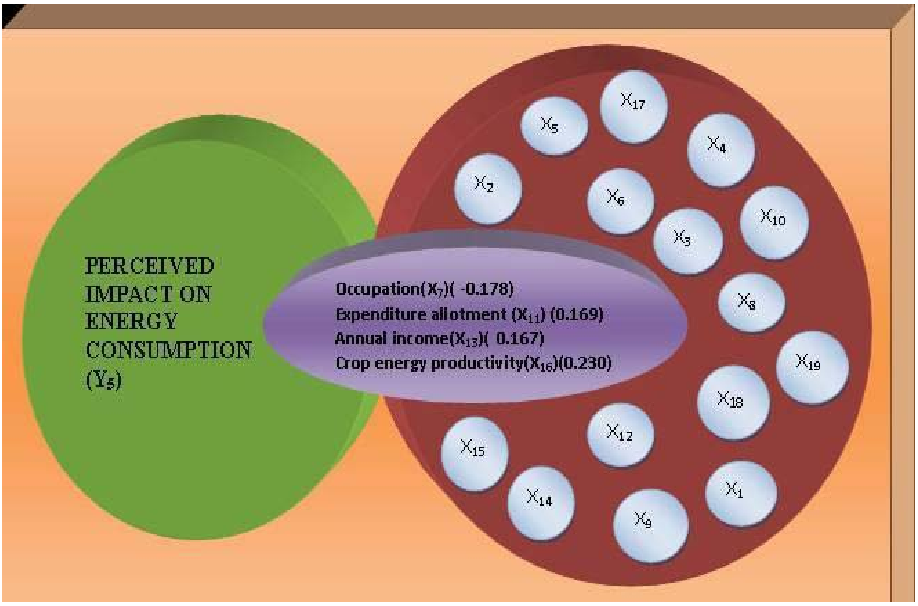
12	CREDIT LOAD(X12)	-0.180	
13	ANNUAL INCOME(X13)	**0.167**	*
14	IRRIGATION INDEX(X14)	-0.011	
15	CROP DIVERSITY INDEX(X15)	-0.031	
16	CROP ENERGY PRODUCTIVITY(X16)	**0.230**	**
17	ADOPTION INDEX(X17)	0.012	
18	SIZE OF WATER BODY(X18)	-0.119	
19	CATTLE HOLDING ECONOMICS(X19)	0.063	

*** =r>0.167 significant at 10% level of significance **= r>0.197 significant at 5% level of significance ***= r>0.258 significant at 1% level of significance**

Results: - Table 6.7 presents the coefficient of correlation between Perceived Impact on Energy Consumption (Y_5) and 19 independent variables (X_1-X_{19}). It has been found that the variable Crop energy productivity (X_{16}) has recorded significant relationship at 5% level of significance and the variables Occupation (X_7), Expenditure allotment (X_{11}) and Annual income (X_{13}) has recorded a significant correlation at 5% level with the dependent variable Impact on Energy Consumption (Y_5).

MODEL - 6.5



Revelation: - In the model-6.5, the present farm ecology of location depicts that higher value of energy capsules are applied in the farm which are under modernization vis-à-vis diversification process. Farm modernization as usual needs higher level of consumption of different energy sources like electricity, diesel, petrol etc. while as occupation farming gets lesser scale value than others. That's why the result shows that with the decline of occupational value or close-to-farming occupation involves higher energy consumption impact.

Expenditure allotment (X_{11}) has recorded also negative coefficient at 10% level. This also highlights another fact of the relationship that depicts that the lesser th expenditure allotment for the respondent, the higher has been the energy consumption impact or when expenditure has gone rationalized, and the perceived impact on energy consumption has been predicted fairly.

Annual income (X_{13}) has rightly recorded as a positive relation with perceived impact on energy consumption (Y_5). Higher the annual income, the more will be the social and economic mobility; hence the higher level of

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energy consumption otherwise. In rural areas the persons on higher income echelons are also the first mover within the social space to connect market hubs, hospitals or strategic locations.

The variable, crop energy productivity (X_{16}), has recorded a positive correlation with perceived crop energy impact to present a high degree of congenital co-variations between two similes i.e. higher energy productivity leads to a higher energy perceived impact. Those who are capable of generating more energy and spending more on energy consumption, they are also a better perceiver of the impact of energy consumption.

Table 6.8 Coefficient of correlation (r) between Farmers' Energy Metabolism (Y_6) and 19 independent variables (X_1-X_{19})

			N = 100
SL. NO.	**VARIABLES**	**r VALUE**	**REMARKS**
1	AGE(X1)	**0.162**	
2	EDUCATION(X2)	-0.030	
3	GENDER RATIO(X3)	0.060	
4	FAMILY SIZE(X4)	0.099	
5	FAMILY EDUCATION STATUS(X5)	-0.070	
6	INNOVATION INDEX(X6)	-0.016	
7	OCCUPATION(X7)	-0.044	
8	FAMILY MIS(X8)	-0.022	
9	CROPPING INTENSITY(X9)	0.067	
10	FARM SIZE(X10)	-0.025	
11	EXPENDITURE ALLOTEMENT(X11)	0.018	
12	CREDIT LOAD(X12)	-0.061	
13	ANNUAL INCOME(X13)	0.028	
14	IRRIGATION INDEX(X14)	0.063	
15	CROP DIVERSITY INDEX(X15)	-0.156	

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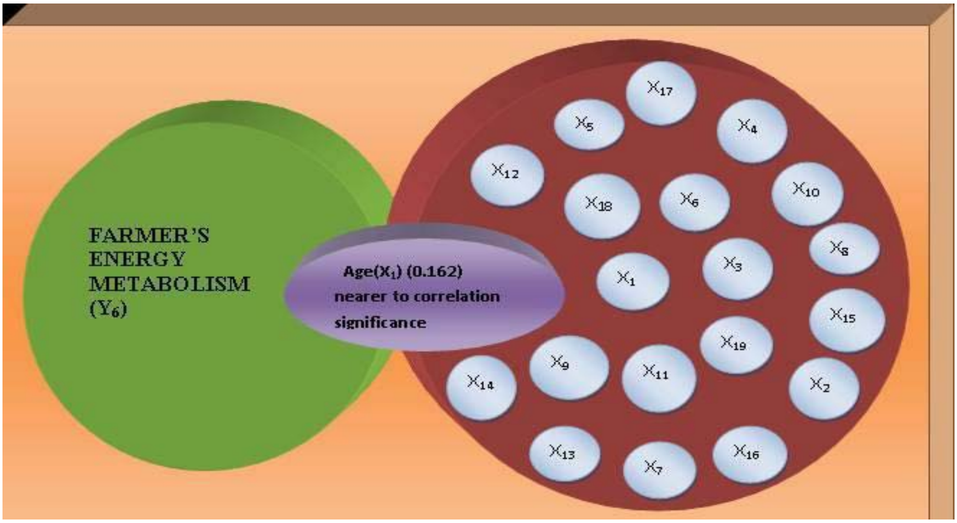
16	CROP ENERGY PRODUCTIVITY(X16)	0.011	
17	ADOPTION INDEX(X17)	-0.037	
18	SIZE OF WATER BODY(X18)	0.011	
19	CATTLE HOLDING ECONOMICS(X19)	0.097	

*** =r>0.167 significant at 10% level of significance **= r>0.197 significant at 5% level of significance ***= r>0.258 significant at 1% level of significance**

Results: - Table 6.8 presents the coefficient of correlation between Farmers' Energy Metabolism (Y_6) and 19 independent variables (X_1-X_{19}). It has been found that the variable Age (X_1) has recorded a nearer significant correlation at 10% level with the dependent variable Farmers' Energy Metabolism (Y_6).

MODEL - 6.6



Revelation: - In the model-6.6, it is a clear indication that chronological age (X_1) is near-to-significance level, which reveals that those farmers who are elder in age have a very sound knowledge of the anabolic and catabolic process in the farm ecosystem as the balances between input energy and out energy are maintained to optimum level.

Table no 6.9 Multiple Steps down Regression analysis: Cattle Energy Balance (Y_1) vs 19 causal variables (X_1-X_{19})

N = 100

SL. NO.	VARIABLES	β	β×R	S,ERROR B	T VALUE	RANK
1	Age(X1)	0.195	**8.502**	4.905	1.687	**III**
2	Education(X2)	-0.082	1.587	18.041	0.596	
3	Gender ratio(X3)	-0.207	**15.617**	62.463	1.869	**II**
4	Family size(X4)	-0.162	6.308	20.365	1.486	
5	Family education status(X5)	0.058	-0.068	28.479	0.421	
6	Innovation index(X6)	-0.046	-0.155	0.003	0.383	
7	Occupation(X7)	0.413	**58.924**	62.884	3.848	**I**
8	Family MIS(X8)	0.150	-1.835	48.127	1.259	
9	Cropping intensity(X9)	-0.059	1.788	0.225	0.501	
10	Farm size(X10)	0.009	0.219	0.975	0.065	
11	Expenditure allotment(X11)	0.050	1.473	7.409	0.461	
12	Credit load(X12)	-0.020	0.411	0.018	0.174	
13	Annual income(X13)	-0.046	-0.882	0.002	0.358	
14	Irrigation index(X14)	0.104	5.560	250.303	0.973	
15	Crop diversity index(X15)	0.143	1.283	737.544	1.251	

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16	Crop energy productivity (X16)	0.019	0.521	0.895	0.165
17	Adoption index(X17)	0.116	0.817	87.540	1.087
18	Size of Water body(X18)	0.008	-0.314	0.331	0.068
19	Cattle holding economics(X19)	0.005	0.245	0.006	0.049

MULTIPLE R^2 = 0.2632 F = 1.50 WITH 19 AND 80 DFS

Results: - The table 6.9 presents the multiple steps-down regression analysis, estimation of the causal effect of 19 independent variables on consequent variable Cattle Energy Balance (Y_1). It has been found that the variable Occupation (X_7) (58.924) has recorded the highest causal effect on Cattle Energy Balance (Y_1) followed by Gender ratio (X_3) (15.617) and Age (X_1) (8.502).

The variable Occupation (X_7) has recorded the highest percentile contribution to the R^2 value. The role and contribution of occupation has been already discussed. So, quite lightly and logically, this variable has been contributed substantially towards the cattle energy balances (Y_1).The subsequent contribution are made by gender ratio and age for the same reason.

The R^2 value being 0.2632, it is to conclude that 26.32 percent of variance in the consequent variable Cattle Energy Balance has been explained with the contributions of these 19 causal variables.

Table 6.9.a: Regression Analysis (Step down): Screening of variables having significant efficacy for character Cattle Energy Balance (Y_1)

Variables	B	β×R	't'
1. Occupation(X7)	0.365	79.551	3.948
2. Gender ratio(X3)	-0.178	20.449	1.919

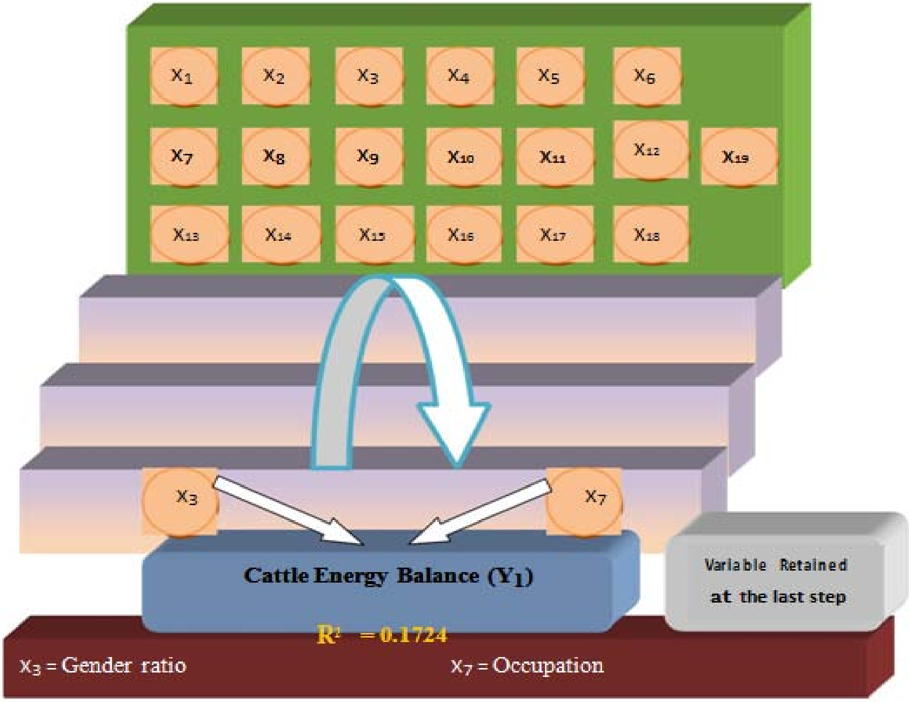
Results: Through the Step-down regression analysis, some few variables out of a plethora of variables have been selected while the causal variable of relatively lesser impacts are drifted out in different steps leading the final steps. This has retained two prominent causal variables viz; Occupation(X_7)

(79.551) and Gender ratio(X_3) (20.449) at the last step. So, these two variables have got substantive strategic and operational impact on Cattle Energy Balance.

Table 6.9.b Model Summary

Model	R	R^2	Adjusted R^2
1.	0.4152	0.1724	0.1553

MODEL- 6.7



Revelation: - The step down regression presents that at the last step of step-down analysis two variables, Occupation(X_7) and Gender ratio(X_3) have contributed the most to Cattle Energy Balances. The sources of energy are linearly related to occupationally livestock raiser which again is impacted by female participation. Only Occupation(X_7) and Gender ratio(X_3) have been retained at the last stage of Step-down Regression Analysis which has contributed 0.1724 percent to the total R^2 value i.e. to say that occupation and women participation deserve to earn a special attention while we intend to make a serious intervention in the domain of Cattle Energy Balance.

Table No 6.10 Multiple Steps down Regression analysis: Energy Equivalence of Cowdung (Y_2) vs 19 causal variables (X_1-X_{19})

						N = 100
SL. NO.	**VARIABLES**	**B**	**β×R**	**S,ERROR B**	**T VALUE**	**RANK**
1	Age(X1)	-0.079	-0.271	0.291	0.680	
2	Education(X2)	0.062	0.291	1.069	0.446	
3	Gender ratio(X3)	-0.031	0.781	3.700	0.278	
4	Family size(X4)	0.020	0.150	1.206	0.178	
5	Family education status(X5)	-0.121	1.009	1.687	0.881	
6	Innovation index(X6)	-0.102	-1.150	0.000	0.842	
7	Occupation(X7)	-0.304	**19.865**	3.725	2.811	**II**
8	Family MIS(X8)	0.073	2.267	2.851	0.611	
9	Cropping intensity(X9)	-0.032	0.950	0.013	0.270	
10	Farm size(X10)	0.020	0.427	0.058	0.152	
11	Expenditure allotment(X11)	-0.031	1.112	0.439	0.282	
12	Credit load(X12)	-0.104	8.600	0.001	0.872	
13	Annual income(X13)	0.163	7.543	0.000	1.256	
14	Irrigation index(X14)	0.073	2.146	14.827	0.681	
15	Crop diversity index(X15)	-0.077	1.593	43.691	0.668	
16	Crop energy productivity (X16)	0.023	0.452	0.053	0.203	
17	Adoption index(X17)	0.049	1.403	5.186	0.450	
18	Size of Water body(X18)	-0.167	**9.514**	0.020	1.335	**III**

19	Cattle holding economics(X19)	0.357	**43.317**	0.000	3.307	**I**

MULTIPLE R2 = 0.2507   F-VALUE = 1.41 WITH 19 AND 80 DFS

Results: - The table 6.10 presents the multiple steps down regression analysis, estimation of the causal effect of 19 independent variables on consequent variable energy equivalence of cowdung (Y_2). It has been found that the variable Cattle holding economics(X_{19}) (43.317) has recorded the highest causal effect on energy equivalence of cowdung (Y_2) followed by Occupation(X_7) (19.865) and Size of Water body(X_{18}) (9.514).

Revelation: Quite logically, energy equivalence of cowdung (Y_2) has well been relegated to the variable cattle holding economics(X_{19}). When the numbers of cattle are above optimal by count, the transforming farming system has taken a consideration to the tuning of cowdung energy to its economy as well.

The occupation (X_7) and size of water holding (X_{18}), by forming a socio-economic diode, have well being causally related to energy equivalence of cow dung.

The R^2 value being 0.2507, it is to conclude that 25.07 percent of variance in the consequent variable energy equivalence of cowdung has been explained with the contribution of these 19 causal variables.

Table 6.10.a: Regression Analysis (Step down): Screening of variables having significant efficacy for character Energy Equivalence of Cowdung (Y2)

Variables	**B**	**β×R**	**'t'**
1. Cattle holding economics(X19)	0.348	73.712	3.634
2. Occupation(X7)	-0.230	26.288	2.405

Results: - Through the Step down regression analysis, some few variables out of a plethora of variables have been selected while the causal variable of relatively lesser impacts are drifted out in different steps leading the final

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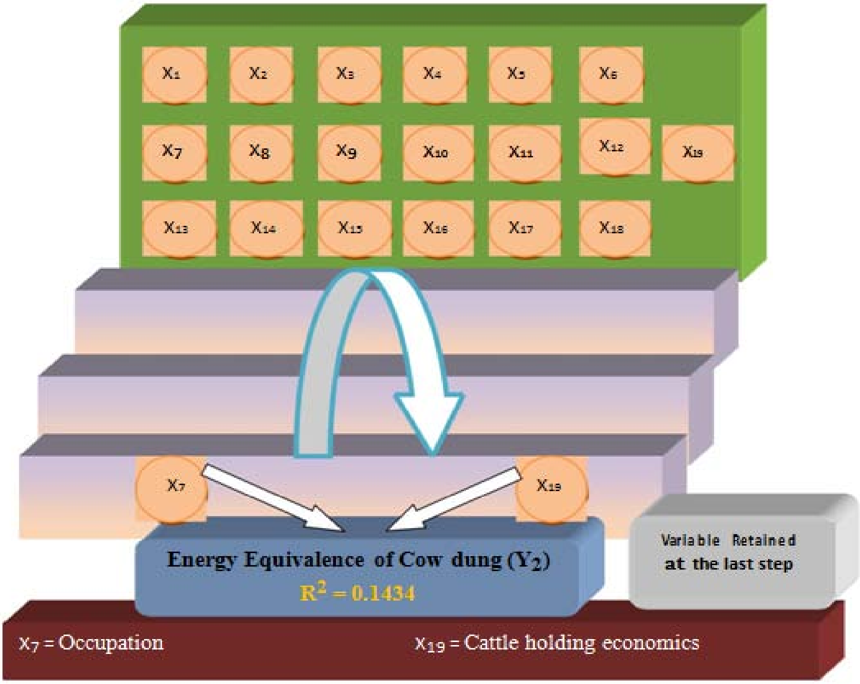
steps. This has retained two prominent causal variables viz; Cattle holding economics (X_{19}) (73.712) and Occupation(X_7) (26.288) at the last step. So, these two variables have got substantive strategic and operational impact on energy equivalence of cowdung.

Table 6.10.b Model Summary

Model	R	R2	Adjusted R2
1.	0.3787	0.1434	0.1258

MODEL - 6.8



Revelation: In compliance with the earlier stated results, these two variables have greater impact than others. The result shows that those who are having livestock rearing as the main occupation are also mentoring the energy equivalence in a better way.

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Table No. 6.11 Multiple Steps down Regression analysis: Crop Energy Metabolism (Y_3) vs 19 causal variables (X_1-X_{19})

N = 100

SL. NO.	VARIABLES	B	β×R	S,ERROR B	T VALUE	RANK
1	Age(X1)	0.255	**40.082**	0.093	2.060	**I**
2	Education(X2)	0.032	0.517	0.343	0.216	
3	Gender ratio(X3)	0.119	**10.389**	1.186	1.003	**III**
4	Family size(X4)	0.035	-1.012	0.387	0.299	
5	Family education status(X5)	0.113	3.696	0.541	0.770	
6	Innovation index(X6)	-0.246	**20.074**	0.000	1.912	**II**
7	Occupation(X7)	-0.003	0.045	1.194	0.029	
8	Family MIS(X8)	-0.006	0.223	0.914	0.049	
9	Cropping intensity(X9)	-0.081	-0.039	0.004	0.636	
10	Farm size(X10)	0.095	5.545	0.019	0.668	
11	Expenditure allotment(X11)	-0.092	3.701	0.141	0.790	
12	Credit load(X12)	-0.017	0.241	0.000	0.134	
13	Annual income(X13)	0.041	0.076	0.000	0.299	
14	Irrigation index(X14)	-0.039	1.190	4.754	0.344	
15	Crop diversity index(X15)	0.018	0.200	14.008	0.148	
16	Crop energy productivity (X16)	0.042	3.483	0.017	0.337	
17	Adoption index(X17)	-0.078	3.776	1.663	0.676	
18	Size of Water body(X18)	0.065	1.185	0.006	0.488	
19	Cattle holding economics(X19)	0.088	6.629	0.000	0.761	

MULTIPLE R^2 = 0.1509 F-VALUE = 0.75 WITH 19AND 80 DFS

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Results: - The table 6.11 presents the multiple steps down regression analysis, estimation of the causal effect of 19 independent variables on consequent variable Crop Energy Metabolism (Y_3). It has been found that the variable Age(X_1) (40.082) has recorded the highest causal effect on Crop Energy Metabolism (Y_3) followed by Innovation index(X_6) (20.074) and Gender ratio (X_3) (10.389).

Revelation: Crop energy metabolism (Y_3) has well been relegated to the variable Age (X_1). So, the experienced farmers have more capability for maintaining crop energy balances than younger farmers. Also the farmers who have more innovative proneness can manage the farm energy very well and also the higher participation of female in farm operation can promote better crop energy metabolism.

The R^2 value being 0.1509, it is to conclude that 15.09 percent of variance in the consequent variable Crop Energy Metabolism has been explained with the contribution of these 19 causal variables.

Table No. 6.11.a: Regression Analysis (Step down): Screening of variables having significant efficacy for character Crop Energy Metabolism (Y_3)

Variables	B	β×R	't'
1. Age(X1)	0.272	74.736	2.751
2. Innovation index(X6)	-0.177	25.264	1.791

Results: - Through the Step down regression analysis, two prominent causal variables viz; Age (X_1) (74.736) and Innovation index (X_6) (25.264) have been retained at the last step. So, these two variables have got substantive strategic and operational impact on crop energy metabolism.

Table No. 6.11.b Model Summary

Model	R	R2	Adjusted R2
1.	0.2940	0.0864	0.0676

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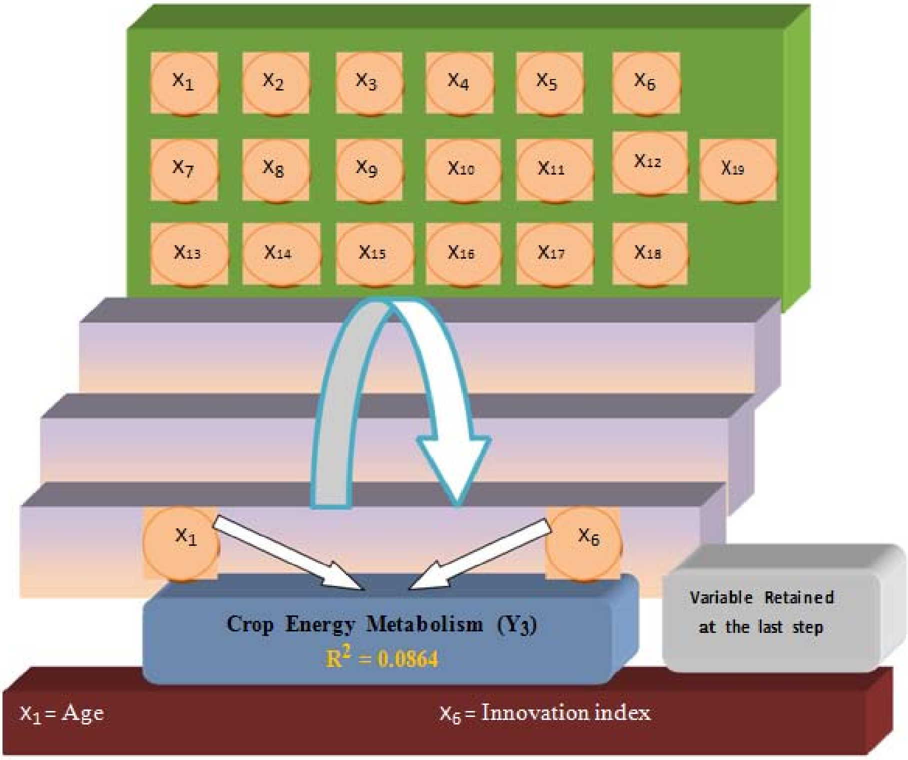
MODEL - 6.9



Revelation: In compliance with the earlier stated results, these two variables, age and innovation index, have greater impact than others. The result shows that those who are experienced and older and obviously having risk bearing ability to adopt new technologies, quite logically have better maintaining capacity of crop energy metabolism.

Table No. 6.12 Multiple Steps down Regression analysis: Energy Consumption in Farm Family (Y_4) vs 19 causal variables (X_1-X_{19})

N = 100

SL. NO.	VARIABLES	B	β×R	S,ERROR B	T VALUE	RANK
1	Age(X1)	-0.145	13.064	0.002	1.204	
2	Education(X2)	0.209	14.958	0.009	1.454	II

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3	Gender ratio(X3)	-0.111	3.909	0.030	0.956	
4	Family size(X4)	0.049	0.707	0.010	0.432	
5	Family education status(X5)	-0.148	-0.076	0.014	1.032	
6	Innovation index(X6)	-0.087	1.590	0.000	0.692	
7	Occupation(X7)	0.085	5.112	0.030	0.753	
8	Family MIS(X8)	0.019	0.184	0.023	0.154	
9	Cropping intensity(X9)	-0.197	7.219	0.000	1.595	
10	Farm size(X10)	0.192	13.560	0.000	1.390	**III**
11	Expenditure allotment(X11)	-0.035	-0.456	0.004	0.310	
12	Credit load(X12)	0.099	6.042	0.000	0.802	
13	Annual income(X13)	0.081	2.508	0.000	0.598	
14	Irrigation index(X14)	-0.093	-1.550	0.120	0.833	
15	Crop diversity index(X15)	0.256	24.660	0.352	2.132	**I**
16	Crop energy productivity (X16)	0.036	-0.084	0.000	0.303	
17	Adoption index(X17)	-0.052	1.298	0.042	0.468	
18	Size of Water body(X18)	0.056	2.450	0.000	0.428	
19	Cattle holding economics(X19)	0.082	4.905	0.000	0.728	

MULTIPLE R^2= 0.1931 F-VALUE FOR R = 1.01 WITH 19AND 80 DFS

Results: - The table 6.12 presents the multiple steps down regression analysis, estimation of the causal effect of 19 independent variables on consequent variable Energy Consumption in Farm Family (Y_4). It has been found that the variable Crop diversity index(X_{15}) (24.660) has recorded the highest causal effect on Energy Consumption in Farm Family (Y_4) followed by Education(X_2) (14.958) and Farm size(X_{10}) (13.560).

Revelation: Crop diversity index(X_{15}) has got substantive relationship with Energy Consumption in Farm Family (Y_4) which is closed and interactive. The energy Consumption pattern in a farm family (daily food intake) has been directly relegated to the crop diversity index and vice-versa. The energy consumption in a family which is a social system or social ecology has got two socio-economic factors: these are education and farm size. Education infers that highly educated people consume more amount of energy through consuming petrol in motorbike, electricity through coloured TV, taking already made fast food as they are always in rush and likewise they record a score of high consumption in their family. Also the farm size recorded a positive relationship with energy consumption in farm family. The higher the farming land size, the more is the energy consumption through using pump set by diesel, more technology utilization.

The R^2 value being 0.1931, it is to conclude that 19.31 percent of variance in the consequent variable Energy Consumption in Farm Family has been explained with the contribution of these 19 causal variables.

Table No. 6.12.a: Regression Analysis (Step down): Screening of variables having significant efficacy for character Energy Consumption in Farm Family (Y_4)

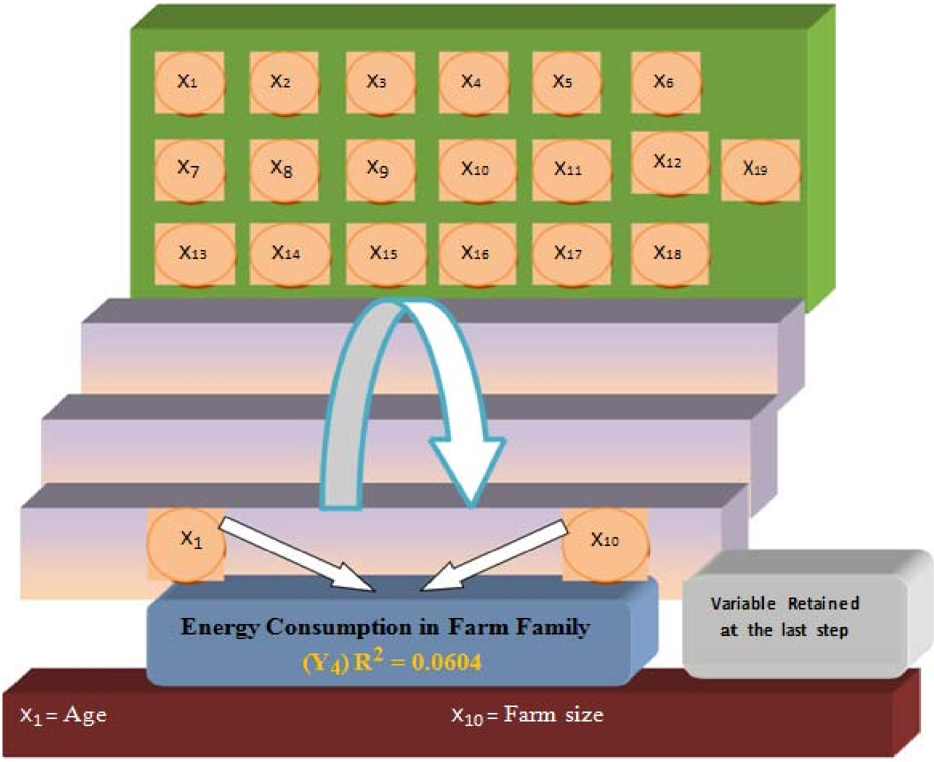
Variables	**β**	**β×R**	**'t'**
1. Age(X1)	-0.209	59.955	2.078
2. Farm size(X10)	0.178	40.045	1.768

Results: - Through the Step down regression analysis, two prominent causal variables viz; Age (X_1) (59.955) and Innovation index (X_6) (40.045) have been retained at the last step. So, these two variables have got substantive strategic and operational impact on energy consumption pattern in farm family.

Table No. 6.12.b Model Summary

Model	R	R2	Adjusted R2
1.	0.2458	0.0604	0.0410

MODEL - 6.10



Revelation: In compliance with the earlier stated results, these two variables, age and farm size, have greater impact than others. The result shows that experienced farmers having bigger size of farm holdings consume more amount of energy in their family.

Table No. 6.13 Multiple Steps down Regression analysis: Perceived Impact on Energy Consumption (Y_5) vs 19 causal variables (X_1-X_{19})

N = 100

SL. NO.	VARIABLES	B	β×R	S,ERROR B	T VALUE	RANK
1	Age(X1)	-0.186	-2.787	0.006	1.576	
2	Education(X2)	-0.136	1.688	0.023	0.969	
3	Gender ratio(X3)	0.044	1.151	0.079	0.392	
4	Family size(X4)	-0.065	2.318	0.026	0.582	
5	Family education status(X5)	0.028	0.350	0.036	0.199	
6	Innovation index(X6)	0.001	0.067	0.000	0.011	
7	Occupation(X7)	-0.247	**19.024**	0.079	2.254	**II**
8	Family MIS(X8)	0.037	1.306	0.061	0.302	
9	Cropping intensity(X9)	0.100	4.264	0.000	0.828	
10	Farm size(X10)	0.158	10.178	0.001	1.172	
11	Expenditure allotment(X11)	-0.187	**13.662**	0.009	1.685	**III**
12	Credit load(X12)	-0.159	12.405	0.000	1.326	
13	Annual income(X13)	0.076	5.491	0.000	0.578	
14	Irrigation index(X14)	0.050	-0.254	0.315	0.455	
15	Crop diversity index(X15)	-0.067	0.903	0.929	0.577	
16	Crop energy productivity (X16)	0.241	**23.893**	0.001	2.060	**I**
17	Adoption index(X17)	-0.028	-0.151	0.110	0.252	

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18	Size of Water body(X18)	-0.108	5.527	0.000	0.847
19	Cattle holding economics(X19)	0.035	0.964	0.000	0.324

MULTIPLE R^2 = 0.2322 F-VALUE = 1.27 WITH 19AND 80 DFS

Results: Table 6.13 presents the multiple steps-down regression analysis, estimation of the causal effect of 19 independent variables on consequent variable Perceived Impact on Energy Consumption (Y_5). It has been found that the variable Crop energy productivity (X_{16}) (23.893) has recorded the highest causal effect on Perceived Impact on Energy Consumption (Y_5) followed by Occupation (X_7) (19.024) and Expenditure allotment (X_{11}) (13.662).

Revelation: Crop energy productivity (X_{16}) has got high intensity operational relationship with perceived impact on energy consumption (Y_5). Closed and interactive as it is, the perceived impact of energy consumption has been directly relegated to the crop energy productivity and vice-versa. The other two variables, Occupation (X_7) and Expenditure allotment (X_{11}), have also recorded a positive and interactive relationship with the perceived impact on energy consumption (Y_5).

The energy consumption in a given farming system or ecology has got two socio-economic factors such as occupation and expenditure allotment to infer that any perception on energy consumption or its impact basically involves socio-ecological performances as well.

The R^2 value has not been found to a substantive level. However the percentile contribution (β×R) value has been considered here.

Table No. 6.13.a: Regression Analysis (Step down): Screening of variables having significant efficacy for character Perceived Impact on Energy Consumption (Y_5)

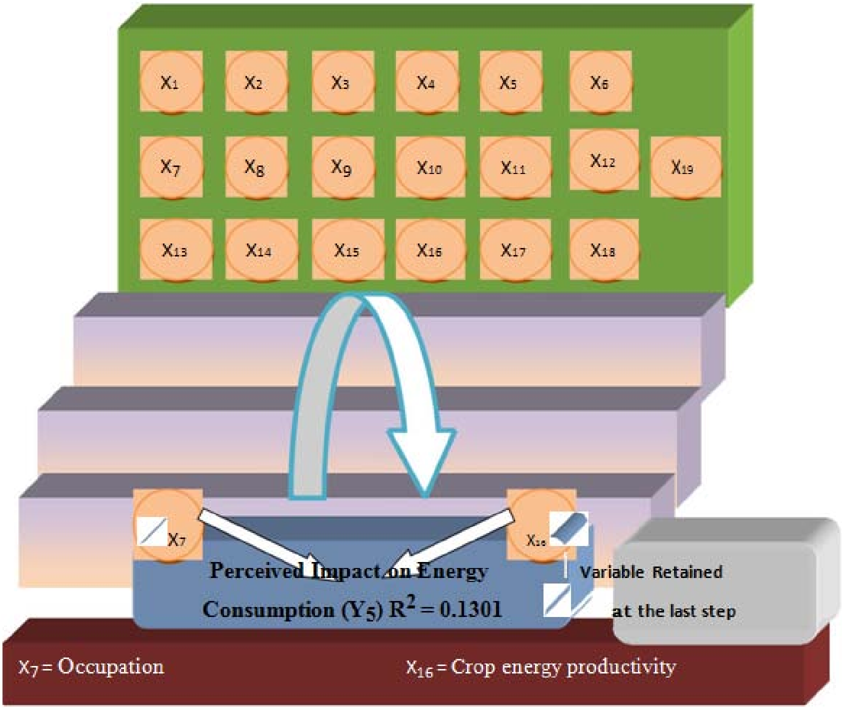
Variables	β	β×R	't'
1. Crop energy productivity (X16)	0.249	44.028	2.610
2. Occupation(X7)	-0.204	28.082	2.139

Results: The table 6.13.a presents the step down regression wherein two prominent variables have been retained by drifting out of the trivial variables and these variables are Crop energy productivity (X_{16}) (44.028) and Occupation (X_7) (28.082).

Table 6.13.b Model Summary

Model	R	R2	Adjusted R2
1.	0.3607	0.1301	0.1029

MODEL - 6.11



Revelation: The two causal variables, Occupation(X_7) and Crop Energy

Productivity(X_{16}), have been dovetailed organically to the perceived impact of energy. Occupation, by dint of its cultural and operational pursuits, has gone deeper into the energy perception echelons. The crop energy productivity, while disposing of their behavioral functions, has got an auto-propelling character in generating energy perception.

Table No. 6.14 Multiple Steps down Regression: analysis Farmers' Energy Metabolism (Y6) vs 19 causal variables (X1-X19)

N = 100

SL. NO.	VARIABLES	B	β×R	S,ERROR B	T VALUE	RANK
1	Age(X1)	0.155	**17.576**	255.984	1.250	**II**
2	Education(X2)	0.121	-2.608	941.525	0.819	
3	Gender ratio(X3)	0.102	4.247	3259.754	0.852	
4	Family size(X4)	0.099	6.840	1062.802	0.845	
5	Family education status(X5)	-0.128	6.302	1486.254	0.867	
6	Innovation index(X6)	-0.064	0.741	0.166	0.497	
7	Occupation(X7)	-0.111	3.438	3281.697	0.961	
8	Family MIS(X8)	-0.115	1.801	2511.612	0.895	
9	Cropping intensity(X9)	0.172	8.022	11.720	1.349	
10	Farm size(X10)	-0.135	2.420	50.867	0.950	
11	Expenditure allotment(X11)	0.098	1.282	386.672	0.834	
12	Credit load(X12)	-0.033	1.389	0.929	0.257	
13	Annual income(X13)	0.108	2.164	0.082	0.777	
14	Irrigation index(X14)	0.106	4.698	13062.531	0.918	
15	Crop diversity index(X15)	-0.281	**30.581**	38490.124	2.278	**I**
16	Crop energy productivity (X16) -0.046		-0.374	46.695	0.369	
17	Adoption index(X17)	-0.037	0.970	4568.459	0.325	

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18	Size of Water body(X18)	0.003	0.021	17.271	0.019	
19	Cattle holding economics(X19)	0.155	**10.489**	0.319	1.345	**III**

MULTIPLE R^2 = 0.1438 F-VALUE = 0.71 WITH 19AND 80 DFS

Results: Table 6.14 presents the multiple steps-down regression analysis, estimation of the causal effect of 19 independent variables on consequent variable Farmers' Energy Metabolism (Y_6). It has been found that the variable Crop diversity index(X_{15}) (30.581) has recorded the highest causal effect on Farmers' Energy Metabolism (Y_6) followed by Age(X_1) (17.576) and Cattle holding economics(X_{19}) (10.489).

Revelation:- The variable, Crop diversity index, has got a substantive relationship with the Farmers' energy metabolism. It is very clear that the more the diversified crop in farmers field, the more is their energy metabolism and vice-versa. Also the significant contribution of these two variables, age and cattle holding economics, has revealed that experienced farmers having cost effective cattle maintenance have better energy metabolism than others.

Table No. 6.14.a: Regression Analysis (Step down): Screening of variables having significant efficacy for character Farmers' Energy Metabolism (Y_6)

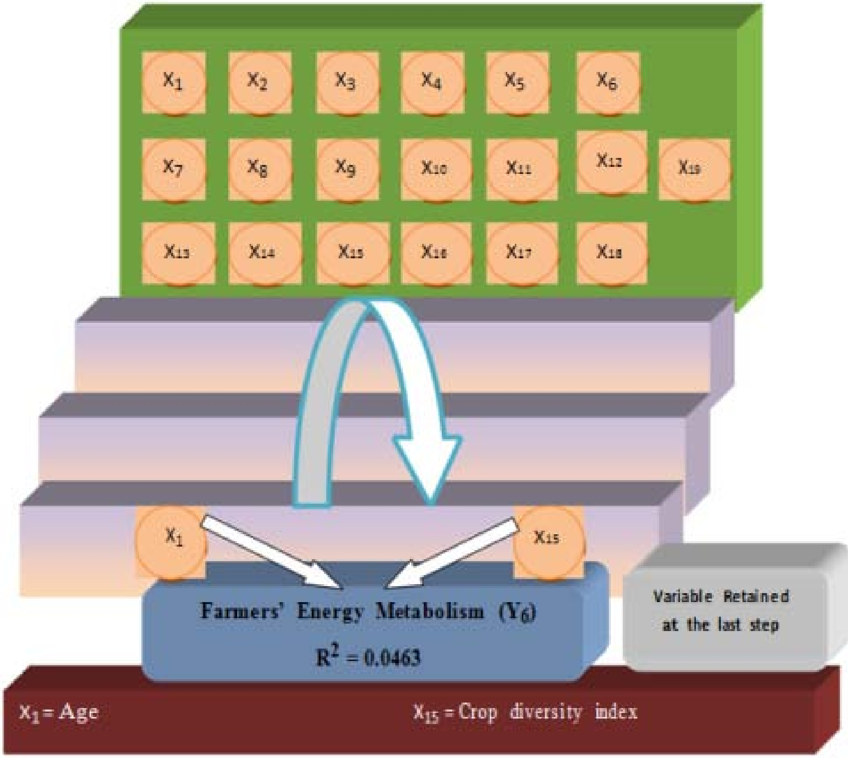
Variables	β	β×R	't'
1. Age(X1)	0.149	52.224	1.492
2. Crop diversity index(X15)	-0.142	47.776	1.421

Results: The table 6.14.a presents the step down regression wherein two prominent variables have been retained by drifting out of the trivial variables and these variables are Crop Age(X_1) (52.224) and Crop diversity index(X_{15}) (47.776).

Table No. 6.14.b Model Summary

Model	R	R2	Adjusted R2
1.	0.2152	0.0463	0.0267

MODEL - 6.12



Revelation: Farm energy metabolism, by becoming an auditing and performing behavior of a farm entrepreneur, and having both economic and ecological elements, age and crop – diversity, dovetails into the farm energy metabolism.

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Table No. 6.15 Path Analysis: Direct, Indirect and Residual effect; Cattle Energy Balance (Y_1) Vs 14 Exogenous Variables (X_1 to X_{19})

N = 100

Sl. No.	**Variables**	**Total Effect (r)**	**Direct Effect (DE)**	**Indirect Effect (IE)=r-DE**	**Highest Indirect Effect**
1.	Age(X1)	0.1150	0.1945	-0.0795	-0.0413(X7)
2.	Education(X2)	-0.0511	-0.0818	0.0307	0.0395(X8)
3.	Gender ratio(X3)	-0.1986	-0.2070	0.0084	0.0318(X8)
4.	Family size(X4)	-0.1025	-0.1619	0.0594	0.0491(X7)
5.	Family education status(X5)	-0.0031	0.0576	-0.0607	-0.0518(X2)
6.	Innovation index(X6)	0.0089	-0.0459	0.0548	0.0387(X1)
7.	Occupation(X7)	0.3755	**0.4130**	-0.0375	-0.0194(X1)
8.	Family MIS(X8)	-0.0322	0.1499	**-0.1821**	-0.0440(X3)
9.	Cropping intensity(X9)	-0.0794	-0.0592	-0.0202	0.0563(X15)
10.	Farm size(X10)	0.0675	0.0085	0.059	0.0384(X1)
11.	Expenditure allotment(X11)	0.0772	0.0502	0.027	0.0517(X7)
12.	Credit load(X12)	-0.0528	-0.0205	-0.0323	-0.0236(X1)

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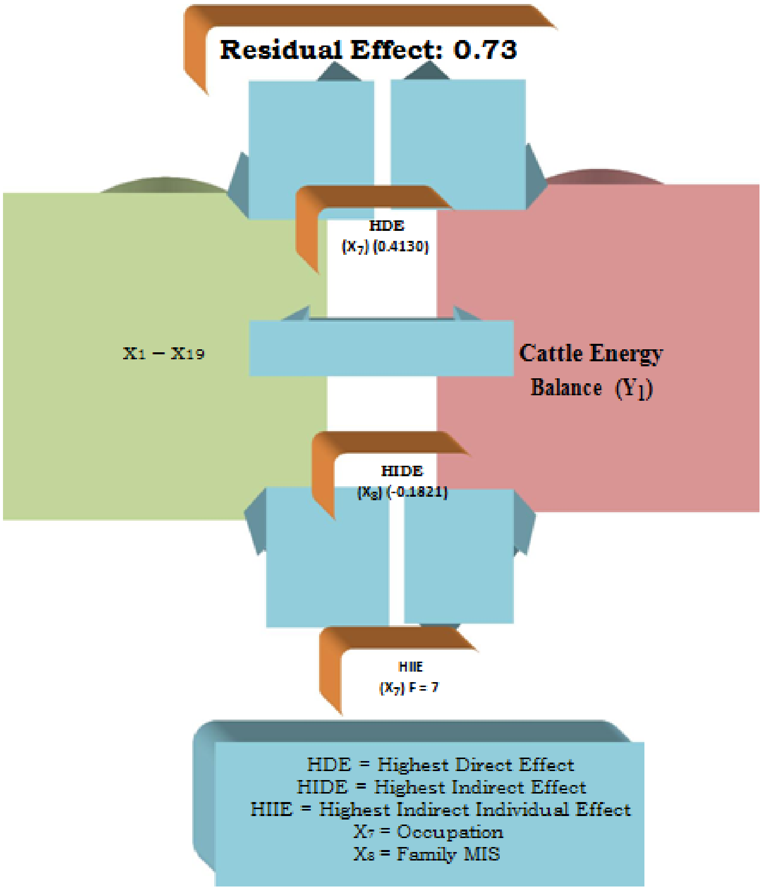
13.	Annual income(X13)	0.0502	-0.0462	0.0964	0.0573(X7)
14.	Irrigation index(X14)	0.1407	0.1040	0.0367	0.0392(X3)
15.	Crop diversity index(X15)	0.0236	0.1433	-0.1197	-0.0365(X4)
16.	Crop energy productivity (X16)	0.0726	0.0189	0.0537	0.0735(X1)
17.	Adoption index(X17)	0.0185	0.1163	-0.0978	-0.0558(X7)
18.	Size of Water body(X18)	-0.0978	0.0084	-0.1062	-0.0655(X7)
19.	Cattle holding economics(X19)	0.1227	0.0053	0.1174	0.0790(X7)

RESIDUAL= 0.7368

Result: The table 6.15 presents the path analysis to decompose the co-efficient of correlation into direct, indirect and residual effect.

It has been found that the Occupation (X_7) (0.4130) has directed highest effect but Family MIS (X_8) (-0.1821) has rooted the highest indirect effect. The variable Occupation (X_7) has figured up as many as 7 times retaining the highest indirect effect as rooted through it.

MODEL - 6.13



Revelation: The traditional livestock raiser as well as entrepreneur, by dint of their occupational characteristics and pursuits, has become able to relegate better crop energy balances, which has been reflected through its dominant direct effects. The indirect effects have been highest for family MIS(X_8) to imply that this variable has got plenty of negotiating viscosity with other variables.

Table No. 6.16 Path Analysis: Direct, Indirect and Residual effect; Energy Equivalence of Cowdung (Y_2) Vs 14 Exogenous Variables (X_1 to X_{19})

N = 100

Sl. No.	**Variables**	**Total Effect (r)**	**Direct Effect (DE)**	**Indirect Effect (IE)=r-DE**	**Highest Indirect Effect**
1.	Age(X1)	0.0086	-0.0791	0.0877	0.0304(X7)
2.	Education(X2)	0.0118	0.0617	-0.0499	-0.0770(X5)
3.	Gender ratio(X3)	-0.0632	-0.0310	-0.0322	-0.0396(X18)
4.	Family size(X4)	0.0192	0.0196	-0.0004	-0.0362(X7)
5.	Family education status(X5)	-0.0208	-0.1215	0.1007	0.0391(X2)
6.	Innovation index(X6)	0.0283	-0.1018	0.1301	0.0758(X13)
7.	Occupation(X7)	-0.1637	-0.3042	**0.1405**	0.0684(X19)
8.	Family MIS(X8)	0.0776	0.0733	0.0043	0.0420(X13)
9.	Cropping intensity(X9)	-0.0740	-0.0322	-0.0418	-0.0326(X19)
10.	Farm size(X10)	0.0530	0.0202	0.0328	0.0856(X13)
11.	Expenditure allotment(X11)	-0.0901	-0.0310	-0.0591	-0.0380(X7)
12.	Credit load(X12)	-0.2081	-0.1036	-0.1045	-0.0735(X18)
13.	Annual income(X13)	0.1159	0.1632	-0.0473	-0.0473(X6)
14.	Irrigation index(X14)	0.0732	0.0735	-0.0003	-0.0250(X7)
15.	Crop diversity index(X15)	-0.0517	-0.0772	0.0255	0.0150(X6)
16.	Crop energy productivity (X16)	0.0484	0.0234	0.025	0.0697(X19)
17.	Adoption index(X17)	0.0724	0.0486	0.0238	0.0411(X7)

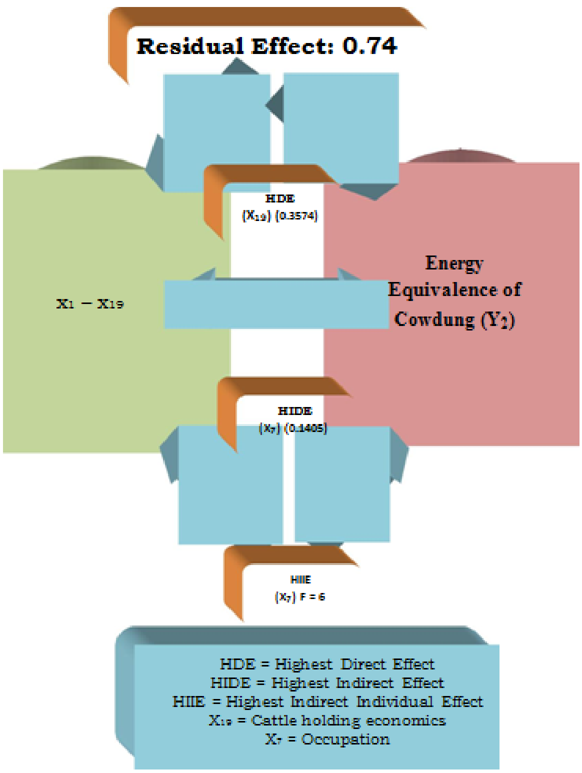
18.	Size of Water body(X18)	-0.1424	-0.0118	-0.1306	-0.1675(X18)
19.	Cattle holding economics(X19)	0.3039	**0.3574**	-0.0535	-0.0582(X7)

RESIDUAL = 0.7493

Result: The table 6.16 presents the path analysis to decompose the co-efficient of correlation into direct, indirect and residual effect.

It has been found that the Cattle holding economics (X_{19}) (0.3574) has directed highest effect but Occupation (X_7) has rooted the highest indirect effect. The variable Occupation (X_7) (0.1405) has figured up as many as 6 times retaining the highest indirect effect as rooted through it.

MODEL - 6.14



Revelation: The cattle holding and energy equivalence of cow dung do form an operational diode. That is why these two variables are

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conspicuously clung to each other. The significant indirect effects as disposed of occupation, has gone implicating to reveal that it has got a fair amount of associational property to work with other variables. Occupation has rooted the highest direct effect as many as six variables to imply that occupation has the substantive impact on energy equivalence of cow dung. The high value of residual effect indicates that in the selection of variables and their level of persistence has suffered from inconsistency.

Table No. 6.17 Path Analysis: Direct, Indirect and Residual effect; Crop Energy Metabolism (Y_3) Vs 14 Exogenous Variables (X_1 to X_{19})

Sl. No.	**Variables**	**Total Effect (r)**	**Direct Effect (DE)**	**Indirect Effect (IE)=r-DE**	**Highest Indirect Effect**
1.	Age(X1)	0.2371	0.2551	-0.018	-0.0490(X6)
2.	Education(X2)	0.0245	0.0318	-0.0073	-0.0445(X6)
3.	Gender ratio(X3)	0.1315	0.1192	0.0123	0.0154(X18)
4.	Family size(X4)	-0.0437	0.0350	-0.0787	-0.0306(X1)
5.	Family education status(X5)	0.0494	**0.1130**	-0.0636	-0.0604(X6)
6.	Innovation index(X6)	-0.1231	-0.2460	**0.1229**	0.0508(X1)
7.	Occupation(X7)	-0.0203	-0.0033	-0.017	-0.0255(X1)
8.	Family MIS(X8)	-0.0537	-0.0063	-0.0474	-0.0508(X6)
9.	Cropping intensity(X9)	0.0007	-0.0808	0.0815	0.0217(X5)
10.	Farm size(X10)	0.0882	0.0948	-0.0066	-0.1083(X6)

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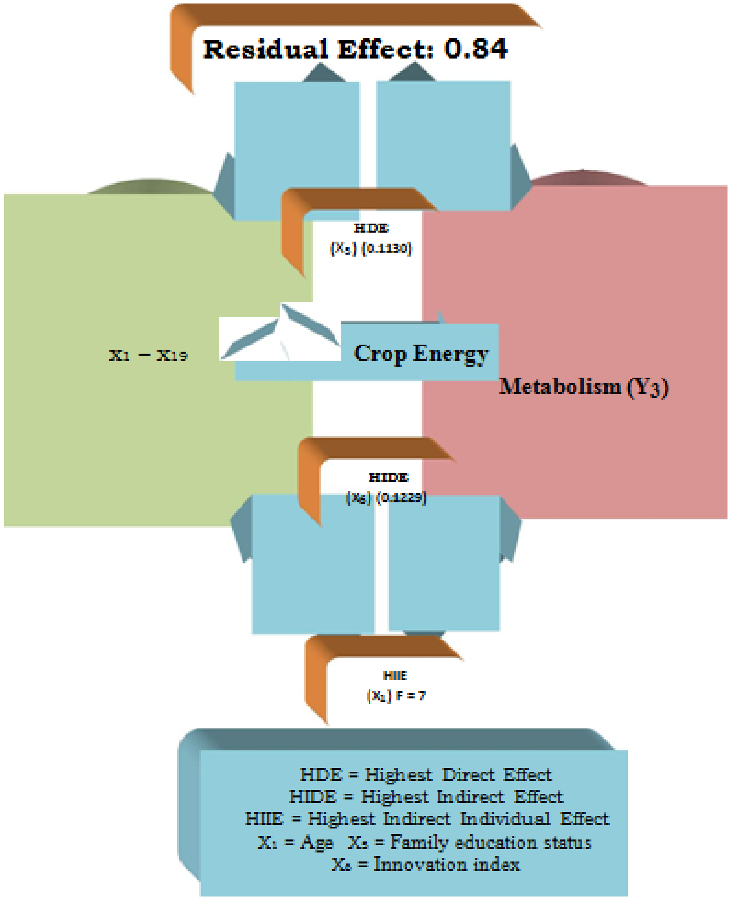
11.	Expenditure allotment(X11)	-0.0605	-0.0923	0.0318	0.0267(X10)
12.	Credit load(X12)	-0.0215	-0.0170	-0.0045	-0.0309(X1)
13.	Annual income(X13)	0.0028	0.0414	-0.0386	-0.1142(X6)
14.	Irrigation index(X14)	-0.0455	-0.0395	-0.006	-0.0226(X3)
15.	Crop diversity index(X15)	0.0166	0.0181	-0.0015	-0.0318(X9)
16.	Crop energy productivity (X16)	0.1265	0.0415	0.085	0.0964(X1)
17.	Adoption index(X17)	-0.0733	-0.0777	0.0044	0.0125(X5)
18.	Size of Water body(X18)	0.0274	0.0653	-0.0379	-0.0444(X1)
19.	Cattle holding economics(X19)	0.1143	0.0875	0.0268	0.0216(X1)

RESIDUAL= 0.8491

Result: The table 43 presents the path analysis to decompose the co-efficient of correlation into direct, indirect and residual effect.

It has been found that the Family education status(X_5) (0.1130) has directed highest effect but Innovation index(X_6) (0.1229) has rooted the highest indirect effect. The variable Age (X_1) has figured up as many as 7 times retaining the highest indirect effect as rooted through it.

MODEL - 6.15



Revelation: The family education status has impacted on crop energy metabolism decisively and dominantly, while the other variable, innovation index, has rooted the significant indirect effect to reveal that this variable has got ample amount of associating property with other variables. The variable, chronological age, has rooted the highest indirect effect of as many as seven variables to imply that age is still a very important indicator to estimate the respondents' contribution towards creating and maintaining crop energy balances. The high value of residual effect indicates that in the selection of variables and their level of persistence has suffered from inconsistency.

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Table No. 6.18 Path Analysis: Direct, Indirect and Residual effect; Energy Consumption in Farm Family (Y_4) Vs 14 Exogenous Variables($X_1 - X_{19}$)

Sl. No.	Variables	Total Effect (r)	Direct Effect (DE)	Indirect Effect (IE)=r-DE	Highest Indirect Effect
1.	Age(X1)	-0.1736	-0.1453	-0.0283	0.0379(X10)
2.	Education(X2)	0.1384	0.2087	-0.0703	-0.0935(X5)
3.	Gender ratio(X3)	-0.0682	-0.1108	0.0426	0.0193(X15)
4.	Family size(X4)	0.0278	0.0492	-0.0214	-0.0505(X9)
5.	Family education status(X5)	0.0010	-0.1476	**0.1486**	0.1322(X2)
6.	Innovation index(X6)	-0.0354	-0.0868	0.0514	0.0846(X10)
7.	Occupation(X7)	0.1167	0.0846	0.0321	-0.0231(X2)
8.	Family MIS(X8)	0.0185	0.0192	-0.0007	-0.0448(X15)
9.	Cropping intensity(X9)	-0.0706	-0.1975	0.1269	0.1004(X15)
10.	Farm size(X10)	0.1363	0.1921	-0.0558	-0.0382(X6)
11.	Expenditure allotment(X11)	0.0250	-0.0353	0.0603	0.0542(X10)
12.	Credit load(X12)	0.1181	0.0988	0.0193	0.0245(X18)

13.	Annual income(X13)	0.0601	0.0806	-0.0205	-0.0403(X6)
14.	Irrigation index(X14)	0.0321	-0.0932	0.1253	0.0264(X15)
15.	Crop diversity index(X15)	0.1864	**0.2556**	-0.0692	-0.0776(X9)
16.	Crop energy productivity (X16)	-0.0044	0.0364	-0.0408	-0.0550(X1)
17.	Adoption index(X17)	-0.0478	-0.0525	0.0047	0.0212(X9)
18.	Size of Water body(X18)	0.0848	0.0558	0.029	0.0434(X12)
19.	Cattle holding economics(X19)	0.1161	0.0816	0.0345	0.0289(X10)

RESIDUAL= 0.8069

Result: The table 6.18 presents the path analysis to decompose the co-efficient of correlation into direct, indirect and residual effect.

It has been found that the Crop diversity index(X_{15}) (0.2556) has directed highest effect but Family education status(X_5) (0.1486) has rooted the highest indirect effect. The variables Farm size(X_{10}) and Crop diversity index(X_{15}) has figured up as many as 4 times retaining the highest indirect effect as rooted through it.

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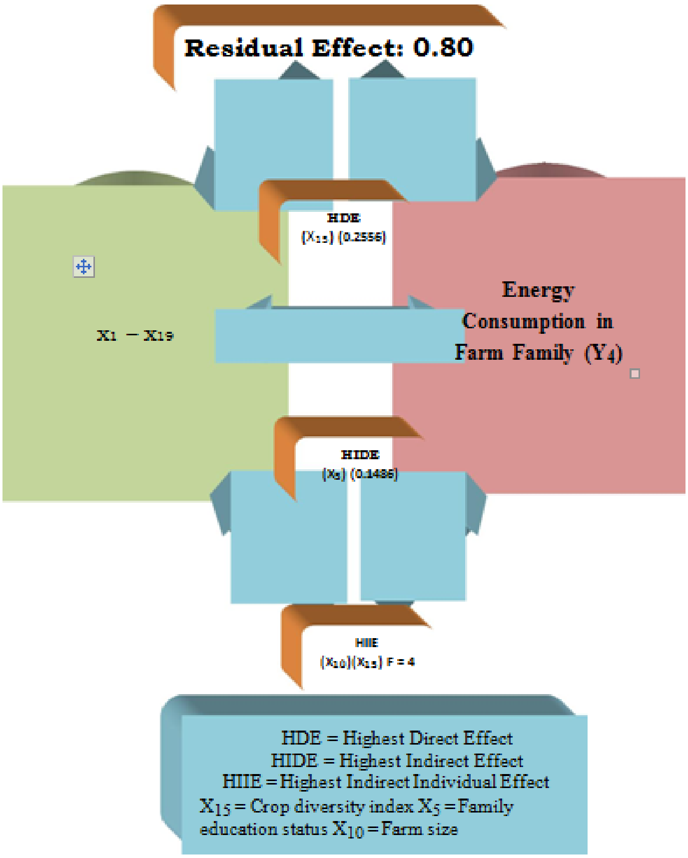
MODEL - 6.16



Revelation: The Crop diversity index has impacted on Energy consumption in farm family decisively and dominantly, while the other variable, family education status, has rooted the significant indirect effect to reveal that this variable has got ample amount of associating property with other variables. The variables Crop diversity index and Farm size, has rooted the highest indirect effect of as many as four variables to imply that crop diversity and farm size are still very important indicators to estimate the respondents' contribution towards creating and maintaining energy consumption pattern in farm family. The high value of residual effect indicates that in the selection of variables and their level of persistence has suffered from inconsistency.

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Table No. 6.19 Path Analysis: Direct, Indirect and Residual effect; Perceived Impact on Energy Consumption (Y_5) Vs 14 Exogenous Variables(X_1 to X_{19})

Sl. No.	Variables	Total Effect (r)	Direct Effect (DE)	Indirect Effect (IE)=r-DE	Highest Indirect Effect
1.	Age(X1)	0.0349	-0.1856	**0.2205**	0.0912(X16)
2.	Education(X2)	-0.0289	-0.1357	0.1068	0.0384(X10)
3.	Gender ratio(X3)	0.0604	0.0443	0.0161	0.0337(X16)
4.	Family size(X4)	-0.0832	-0.0647	-0.0185	-0.0414(X16)
5.	Family education status(X5)	0.0292	0.0278	0.0014	0.0475(X10)
6.	Innovation index(X6)	0.1171	0.0013	0.1158	0.0696(X10)
7.	Occupation(X7)	-0.1789	**-0.2470**	0.0681	0.0186(X1)
8.	Family MIS(X8)	0.0826	0.0367	0.0459	-0.0357(X2)
9.	Cropping intensity(X9)	0.0990	0.1000	-0.001	-0.0287(X2)
10.	Farm size(X10)	0.1495	0.1581	-0.0086	-0.0528(X11)
11.	Expenditure allotment(X11)	-0.1696	-0.1871	0.0175	0.0446(X10)
12.	Credit load(X12)	-0.1807	-0.1595	-0.0212	-0.0473(X18)
13.	Annual income(X13)	0.1677	0.0760	0.0917	0.0829(X10)
14.	Irrigation index(X14)	-0.0119	0.0496	-0.0615	-0.0362(X16)
15.	Crop diversity index(X15)	-0.0311	-0.0675	0.0364	0.0393(X9)
16.	Crop energy productivity (X16)	0.2300	0.2413	-0.0113	-0.0702(X1)
17.	Adoption index(X17)	0.0127	-0.0276	0.0403	0.0334(X7)

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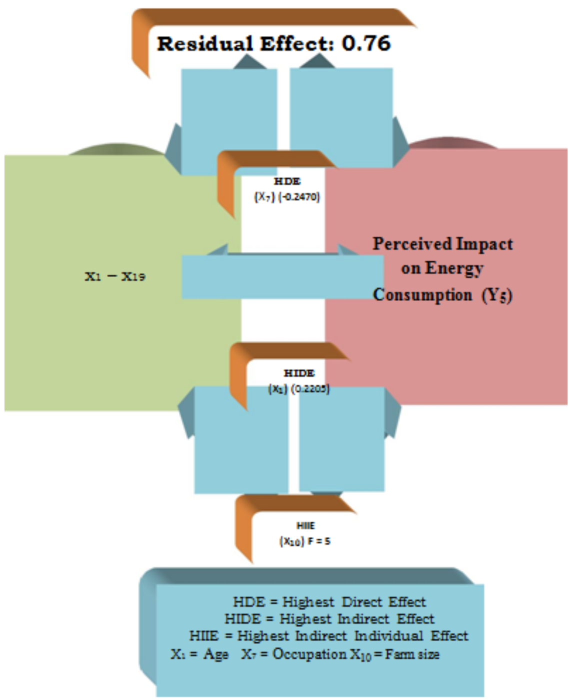
18.	Size of Water body(X18)	-0.1193	-0.1076	-0.0117	0.0392(X7)
19.	Cattle holding economics(X19)	0.0631	0.0354	0.0277	0.0470(X16)

RESIDUAL= 0.7678

Result: The table 6.19 presents the path analysis to decompose the co-efficient of correlation into direct, indirect and residual effect.

It has been found that the Occupation(X_7) (-0.2470) has directed highest effect but Age(X_1) (0.2205) has rooted the highest indirect effect. The variables Farm size (X_{10}) and Crop energy productivity (X_{16}) has figured up as many as 4 times retaining the highest indirect effect as rooted through it.

MODEL - 6.17



Revelation: Occupation has rooted the highest direct effect on perception on energy consumption pattern, while the other variable, chronological age, has impacted the significant indirect effect on it. The variable, farm size, has rooted the highest indirect effect of as many as five to imply that crop diversity and farm size are still very important indicators to estimate the respondents' contribution towards maintaining energy consumption pattern in farm family. The high value of residual effect indicates that in the selection of variables and their level of persistence has suffered from inconsistency.

Table No. 6.20 Path Analysis: Direct, Indirect and Residual effect; Farmers' Energy Metabolism (Y_6) Vs 14 Exogenous Variables(X_1 to X_{19})

Sl. No.	Variables	Total Effect (r)	Direct Effect (DE)	Indirect Effect (IE)=r-DE	Highest Indirect Effect
1.	Age(X1)	0.1627	0.1554	0.0073	0.0279(X15)
2.	Education(X2)	-0.0309	0.1212	**-0.1521**	-0.0810(X5)
3.	Gender ratio(X3)	0.0600	0.1018	-0.0418	-0.0244(X8)
4.	Family size(X4)	0.0992	0.0992	0	0
5.	Family education status(X5)	-0.0709	-0.1278	0.0569	0.0768(X2)
6.	Innovation index(X6)	-0.0166	-0.0642	0.0476	0.0501(X13)
7.	Occupation(X7)	-0.0445	-0.1112	0.0672	0.0297(X19)
8.	Family MIS(X8)	-0.0226	-0.1149	0.0923	0.0493(X15)
9.	Cropping intensity(X9)	0.0670	0.1721	-0.1051	-0.1106(X15)
10.	Farm size(X10)	-0.0257	-0.1354	0.1097	0.0566(X13)

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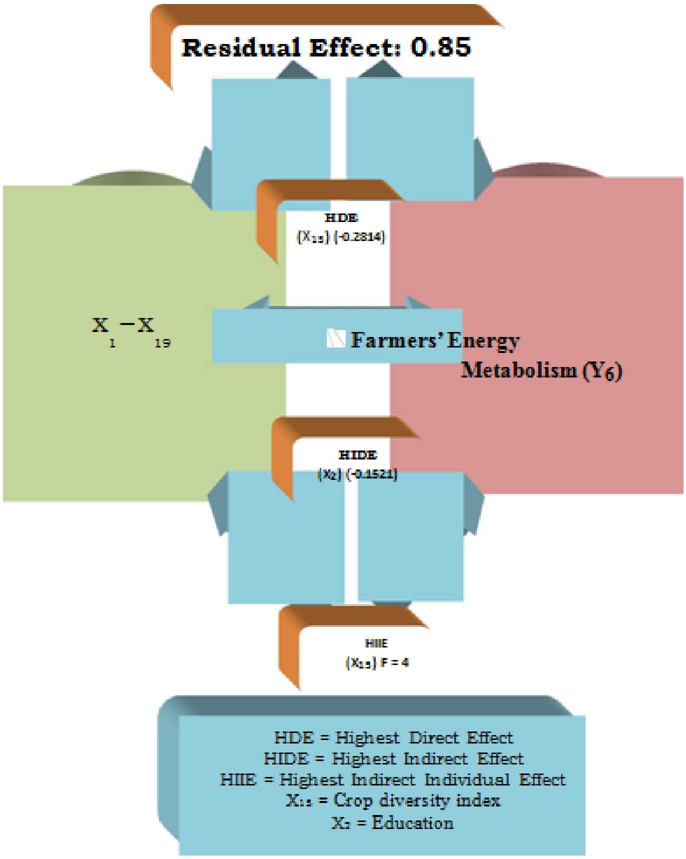
11.	Expenditure allotment(X11)	0.0189	0.0978	-0.0789	-0.0382(X10)
12.	Credit load(X12)	-0.0612	-0.0327	-0.0285	-0.0188(X1)
13.	Annual income(X13)	0.0288	0.1079	-0.0791	-0.0710(X10)
14.	Irrigation index(X14)	0.0639	0.1058	-0.0419	-0.0291(X15)
15.	Crop diversity index(X15)	-0.1563	**-0.2814**	0.1251	0.0676(X9)
16.	Crop energy productivity (X16)	0.0118	-0.0456	0.0574	0.0587(X1)
17.	Adoption index(X17)	-0.0372	-0.0375	0.0003	0.0168(X8)
18.	Size of Water body(X18)	0.0119	0.0026	0.0145	0.0241(X3)
19.	Cattle holding economics(X19)	0.0971	0.1554	-0.0583	-0.0213(X7)

RESIDUAL= 0.8562

Result: The table 6.20 presents the path analysis to decompose the co-efficient of correlation into direct, indirect and residual effect.

It has been found that the Crop diversity index(X_{15}) (-0.2814) has directed highest effect but Education(X_2) (-0.1521) has rooted the highest indirect effect. The variables Farm size (X_{10}) and Crop diversity index(X_{15}) has figured up as many as 4 times retaining the highest indirect effect as rooted through it.

MODEL - 6.18



Revelation: Crop diversity index has rooted the highest direct effect on farmer's energy metabolism, while the other variable, education, has impacted the significant indirect effect on it. The variable, crop diversity index, has rooted the highest indirect effect of as many as four variables to imply that crop diversity is still very important indicator to estimate the respondents' contribution towards maintaining energy farmer's energy balances. The high value of residual effect indicates that in the selection of variables and their level of persistence has suffered from inconsistency.

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Table No. 6.21 Factor analysis: conglomeration of 19 independent variables(x_1-x_{19}) into 8 factors and renaming

Sl. No.	Factors	Variables included	% of variance	Cumulative %	Rename
1	Factor-I	Family education status(X5) Innovation index(X6) Farm size(X10) Annual income(X13)	14.215	14.215	Family resource potential
2	Factor-II	Age(X1) Education(X2) Cropping intensity(X9) Crop diversity index(X15) Crop energy productivity (X16)	10.902	25.116	Crop-gender ecology
3	Factor-III	Credit load(X12) Size of Water body(X18)	9.430	34.547	Credit-water diode
4	Factor-IV	Gender ratio(X3) Irrigation index(X14)	7.624	42.171	Gender-irrigation diode
5	Factor-V	Occupation(X7) Family MIS(X8)	7.302	49.472	Occupational communication

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6	Factor-VI	Adoption index(X17)	6.270	62.756	Adoption index
7	Factor-VII	Expenditure allotment(X11) Cattle holding economics(X19)	4.997	73.312	Livestock entrepreneurship
8	Factor-VIII	Family size(X4)	4.033	77.345	Family size

Revelation: In factor analysis, the apparently different variables are operationally conglomerated, based on factor loading, into some factors. That is why they need to undergo a renaming as well. This will help to rationalize the number of variables into some manageable and perceptible count.

Based on efficacy to explain variables of each of the factors, the resource can be allocated to them for ushering in a better system functioning.

It has been found that factor-1 has accommodated the following variables: $\mathbf{X_5, X_6, X_{10}, X_{13}}$ **within** a common bracket and has been renamed as **Family Resource Potential.**

It has been found that factor-2 has accommodated the following variables: $\mathbf{X_1, X_2, X_9, X_{15}, X_{16}}$ within a common bracket and has been renamed as **Crop Gender Ecology.**

It has been found that factor-3 has accommodated the following variables: $\mathbf{X_{12}, X_{18}}$ within a common bracket and has been renamed as **Credit-water diode.**

It has been found that factor-4 has accommodated the following variables: $\mathbf{X_3, X_{14}}$ within a common bracket and has been renamed as **Gender-irrigation diode.**

It has been found that factor-5 has accommodated the following variables: $\mathbf{X_7, X_8}$ within a common bracket and has been renamed as **Occupational communication.**

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It has been found that factor-6 has accommodated the following variables: X_{17} within a common bracket and has been renamed as **Adoption index**.

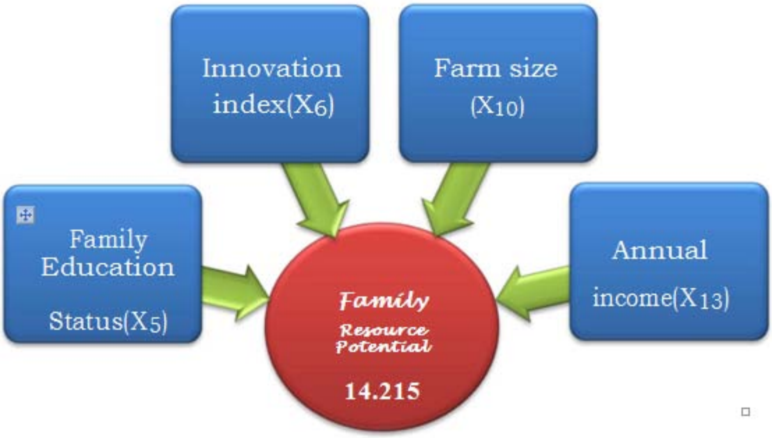
It has been found that factor-7 has accommodated the following variables: X_{11}, X_{19} within a common bracket and has been renamed as **Livestock entrepreneurship.**

It has been found that factor-8 has accommodated the following variables: X_4 within a common bracket and has been renamed as **Family size.**

Model On Factor Analysis: Conglomeration of homogeneous variables based on factor loading into factors

Factor 1 → Family resource potential

1. MODEL - 6.19



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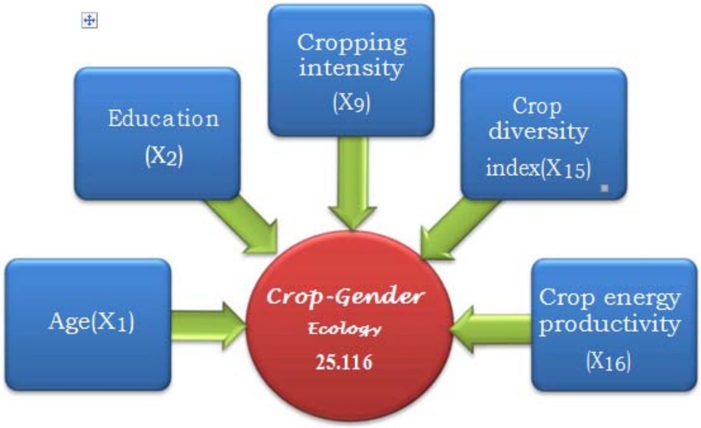
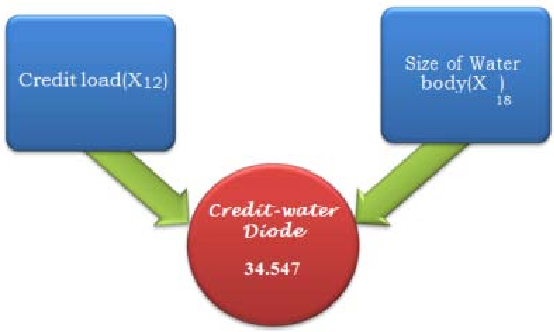
Factor 2→ Crop-gender ecology

MODEL - 6.20



Factor 3 → Credit-water diode

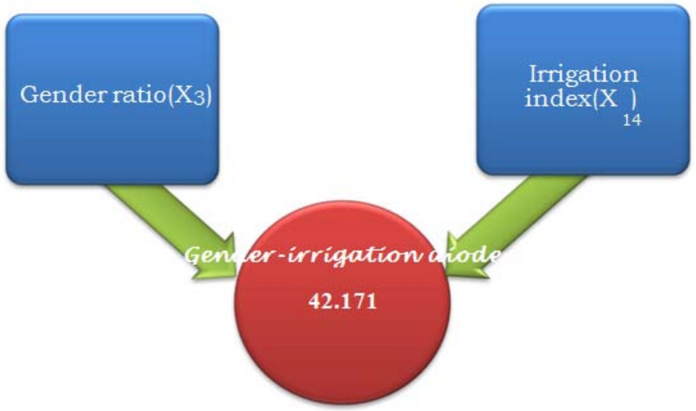
MODEL - 6.21



Factor 4→ Gender-irrigation diode

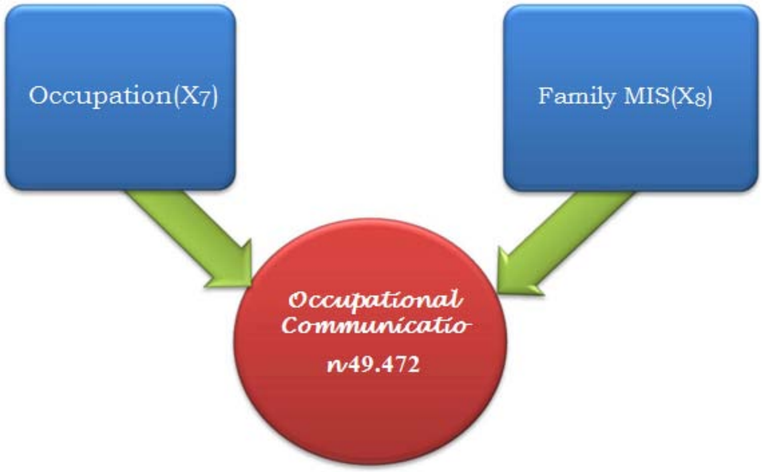
ISBN: **978-93-85822-54-4**

MODEL - 6.22



Factor 5→ Occupational communication

MODEL - 6.23



Factor 6→ Adoption index

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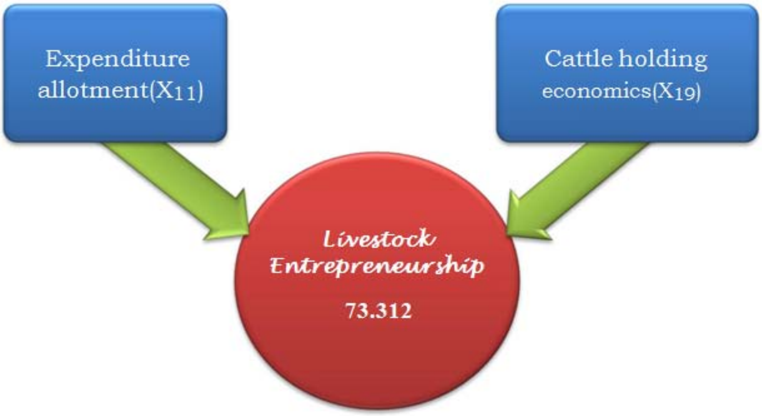
MODEL - 6.24

Factor 7 → Livestock entrepreneurship

MODEL - 6.25



Factor 8 → Family size

MODEL - 6.26

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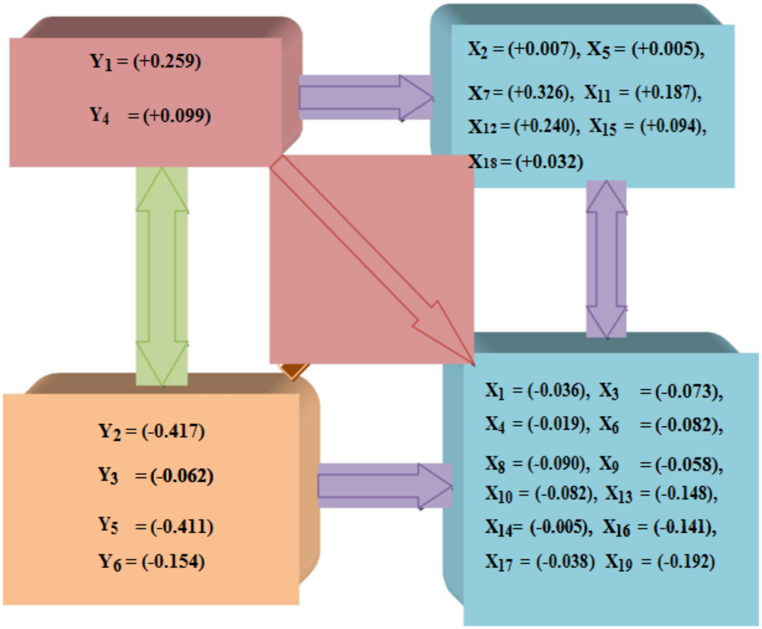
Model on Canonical Covariate Analysis: The set wise interaction between 19 independent variables with Cattle energy balance (Y_1)

MODEL NO 6.27



ISBN: **978-93-85822-54-4**

INDEPENDENT VARIABLES **Age(X_1) Education(X_2) Gender ratio(X_3) Family size(X_4) Family education status(X_5) Innovation index(X_6) Occupation(X_7) Family MIS(X_8) Cropping intensity(X_9) Farm size(X_{10}) Expenditure allotment(X_{11}) Credit load(X_{12}) Annual income(X_{13}) Irrigation index(X_{14}) Crop diversity index(X_{15}) Crop energy productivity (X_{16}) Adoption index(X_{17}) Size of water body(X_{18}) Cattle holding economics(X_{19})**
DEPENDENT VARIABLES **Cattle energy balance (Y_1) Energy equivalence of cowdung (Y_2) Crop energy metabolism (Y_3) Energy consumption in farm family (Y_4) Perceived impact on energy consumption (Y_5) Farmer's energy metabolism (Y_6)**

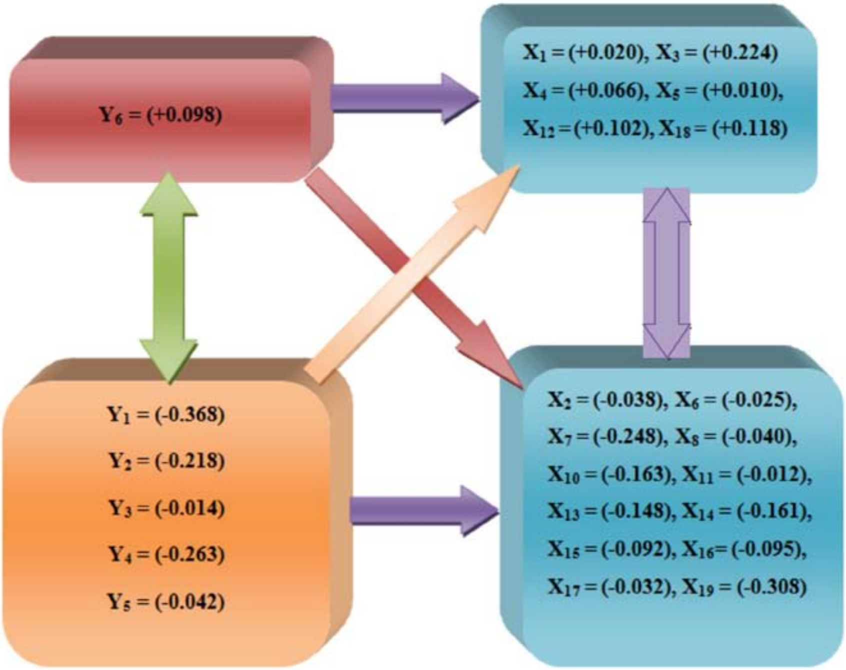
Revelation: - Model 6.27 presents the paradigm on canonical covariates to depict the concurrent interaction amongst and between the left side and right side variables. It is interesting to note that the two left side variable Cattle energy balance (Y_1) and Energy consumption in farm family (Y_4) have hooked up as many as 7 exogenous variables (both X and Y are having the same positive direction) to imply that Cattle energy balance and Energy consumption in farm family while in simultaneous interaction with other variables of Y set (Y_2, Y_3, Y_5, Y_6), it has clear choice for these 7 exogenous variables. So, in this web of interaction, Cattle energy balance (Y_1) and Energy consumption in farm family (Y_4) will change in the same direction as well as proportion Education(X_2), Family education status(X_5), Occupation(X_7), Expenditure allotment(X_{11}), Credit load(X_{12}), Crop diversity index(X_{15}), Size of water body(X_{18}) are changing.

The Occupation(X_7, +0.326) is presenting the highest canonical covariate to suggest that occupationally livestock raiser and farmer have the more importance in characterizing the energy perception and consumption pattern and so also for other variables in respect of proportionate canonical covariates.

Similarly the left side variable Energy equivalence of cow dung (Y_2), Crop energy metabolism (Y_3), Perceived impact on energy consumption (Y_5) and Farmer's energy metabolism (Y_6) have got clandestine selection from the right side variable (as both having negative signs direction) to imply that the energy equivalence of cow dung has got respective and proportionate weightage contributed by Cattle holding economics (X_{19}) (-0.192) followed by Age(X_1), Gender ratio(X_3), Family size(X_4), Innovation index(X_6), Family MIS(X_8), Cropping intensity(X_9), Farm size(X_{10}), Annual income(X_{13}), Irrigation index(X_{14}), Crop energy productivity (X_{16}) Adoption index(X_{17}) in proportion with the canonical covariates.

Model on Canonical Covariate Analysis: The set wise interaction between 19 independent variables with Energy Equivalence of cowdung (Y_2)

MODEL NO 6.28



ISBN: **978-93-85822-54-4**

INDEPENDENT VARIABLES **Age(X_1) Education(X_2) Gender ratio(X_3) Family size(X_4) Family education status(X_5) Innovation index(X_6) Occupation(X_7) Family MIS(X_8) Cropping intensity(X_9) Farm size(X_{10}) Expenditure allotment(X_{11}) Credit load(X_{12}) Annual income(X_{13}) Irrigation index(X_{14}) Crop diversity index(X_{15}) Crop energy productivity (X_{16}) Adoption index(X_{17}) Size of water body(X_{18}) Cattle holding economics(X_{19})**
DEPENDENT VARIABLES **Cattle energy balance (Y_1) Energy equivalence of cowdung (Y_2) Crop energy metabolism (Y_3) Energy consumption in farm family (Y_4) Perceived impact on energy consumption (Y_5) Farmer's energy metabolism (Y_6)**

Revelation: Model 6.28 presents the paradigm on canonical covariates to depict the concurrent interaction amongst and between the left side and right side variables. It is interesting to note that the left side variable Farmer's energy metabolism (Y_6) has hooked up as many as 6 exogenous variables (both X and Y are having the same positive direction) to imply that Farmer's energy metabolism while in simultaneous interaction with other variables of Y set (Y_1, Y_2, Y_3, Y_4, Y_5), it has clear choice for these 6 exogenous variables. So, in this web of interaction, Farmer's energy metabolism (Y_6) will change in the same direction as well as proportion Age(X_1), Gender ratio(X_3), Family size(X_4), Family education status(X_5), Credit load(X_{12}) and Size of water body(X_{18}) are changing.

The Gender ratio(X_3, +0.224) is presenting the highest canonical covariate to suggest that female participation is the important determinant for characterizing the energy consumption by farmers and so also for other variables in respect of proportionate canonical covariates.

Similarly the left side variables, Cattle energy balance(Y_1), Energy equivalence of cow dung (Y_2), Crop energy metabolism (Y_3), Energy consumption in farm family (Y_4) and Perceived impact on energy consumption (Y_5) have got clandestine selection from the right side variable (as both having negative signs direction) to imply that the energy equivalence of cow dung has got respective and proportionate weightage contributed by Cattle holding economics (X_{19}) (-0.308) followed by

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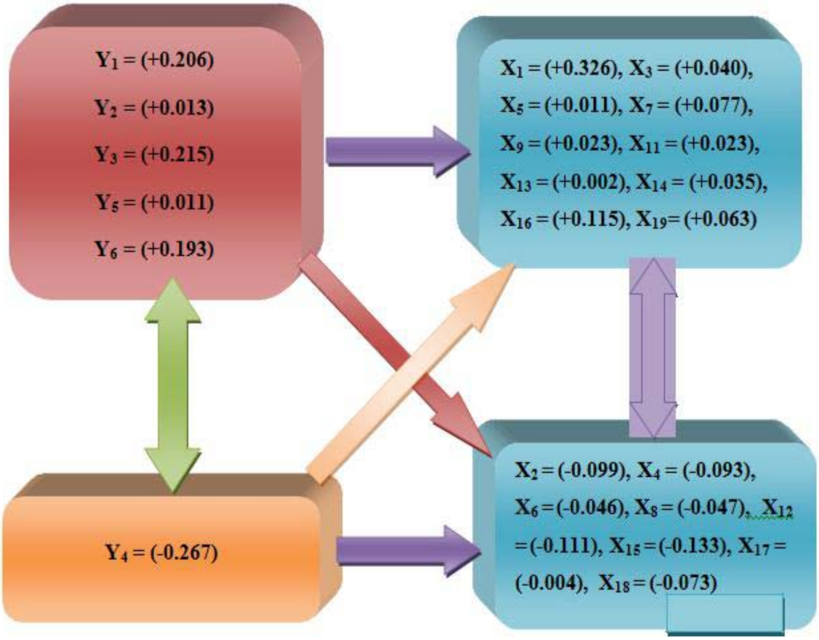
Education(X_2), Innovation index(X_6), Occupation(X_7), Family MIS(X_8), Farm size(X_{10}), Expenditure allotment(X_{11}), Annual income(X_{13}), Irrigation index(X_{14}), Crop diversity index(X_{15}), Crop energy productivity (X_{16}) Adoption index(X_{17}) in proportion with the canonical covariates.

Model on Canonical Covariate Analysis: the set wise interaction between 19 independent variables with Crop Energy Metabolism (Y_3)

MODEL NO 6.29



INDEPENDENT VARIABLES
Age(X_1) Education(X_2) Gender ratio(X_3) Family size(X_4) Family education status(X_5) Innovation index(X_6) Occupation(X_7) Family MIS(X_8) Cropping intensity(X_9) Farm size(X_{10}) Expenditure allotment(X_{11}) Credit load(X_{12}) Annual income(X_{13}) Irrigation index(X_{14}) Crop diversity index(X_{15}) Crop energy productivity (X_{16}) Adoption index(X_{17}) Size of water body(X_{18}) Cattle holding economics(X_{19})
DEPENDENT VARIABLES
Cattle energy balance (Y_1) Energy equivalence of cowdung (Y_2) Crop energy metabolism (Y_3) Energy consumption in farm family (Y_4) Perceived impact on energy consumption (Y_5) Farmer's energy metabolism (Y_6)

Revelation: Model 6.29 presents the paradigm on canonical covariates to depict the concurrent interaction amongst and between the left side and right side variables. It is interesting to note that the left side variables, Cattle energy balance (Y_1), Energy equivalence of cowdung (Y_2), Crop energy metabolism (Y_3), Perceived impact on energy consumption (Y_5) and Farmer's energy metabolism (Y_6) have hooked up as many as 10 exogenous variables (both X and Y are having the same positive direction) to imply that Farmer's energy metabolism while in simultaneous interaction with other variables of Y set (Y_4), it has clear choice for these 10 exogenous variables. So, in this web of interaction, Cattle energy balance (Y_1), Energy equivalence of cow dung (Y_2), Crop energy metabolism (Y_3), Perceived impact on energy consumption (Y_5) and Farmer's energy metabolism (Y_6) will change in the same direction as well as proportion Age(X_1), Gender ratio(X_3), Family education status(X_5),Occupation(X_7), Cropping intensity (X_9), Expenditure allotment (X_{11}), Annual income (X_{13}), Irrigation index (X_{14}), Crop energy productivity (X_{16}) and Cattle holding economics (X_{19}) are changing.

The Age (X_1, +0.326) is presenting the highest canonical covariate to suggest that female participation is the important determinant for characterizing the crop energy balances, efficient use of cowdung, energy perception and consumption by farmers and so also for other variables in respect of proportionate canonical covariates.

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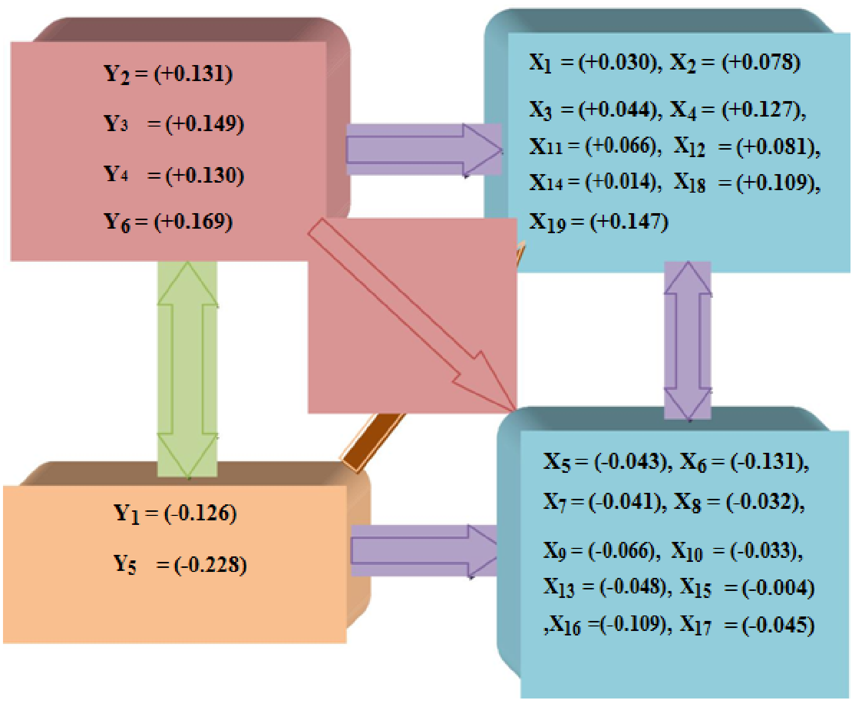
Similarly the left side variable, Energy consumption in farm family(Y_4) has got clandestine selection from the right side variable (as both having negative signs direction) to imply that the energy equivalence of cow dung has got respective and proportionate weightage contributed by Crop diversity index (X_{15}) (-0.133) followed by Education(X_2), Family size (X_4), Innovation index(X_6), Family MIS(X_8), Farm size(X_{10}), Credit load (X_{12}), Adoption index(X_{17}) and Size of water body (X_{18}) in proportion with the canonical covariates.

Model on Canonical Covariate Analysis: The set wise interaction between 19 independent variables with Energy Consumption in Farm Family (Y_4)

MODEL NO 6.30



ISBN: **978-93-85822-54-4**

INDEPENDENT VARIABLES Age(X_1) Education(X_2) Gender ratio(X_3) Family size(X_4) Family education status(X_5) Innovation index(X_6) Occupation(X_7) Family MIS(X_8) Cropping intensity(X_9) Farm size(X_{10}) Expenditure allotment(X_{11}) Credit load(X_{12}) Annual income(X_{13}) Irrigation index(X_{14}) Crop diversity index(X_{15}) Crop energy productivity (X_{16}) Adoption index(X_{17}) Size of water body(X_{18}) Cattle holding economics(X_{19})
DEPENDENT VARIABLES Cattle energy balance (Y_1) Energy equivalence of cowdung (Y_2) Crop energy metabolism (Y_3) Energy consumption in farm family (Y_4) Perceived impact on energy consumption (Y_5) Farmer's energy metabolism (Y_6)

Revelation: Model 6.30 presents the paradigm on canonical covariates to depict the concurrent interaction amongst and between the left side and right side variables. It is interesting to note that the left side variables, Energy equivalence of cowdung (Y_2), Crop energy metabolism (Y_3), Energy consumption in farm family(Y_4) and Farmer's energy metabolism (Y_6), have hooked up as many as 9 exogenous variables (both X and Y are having the same positive direction) to imply that Energy equivalence of cowdung, Crop energy metabolism, Energy consumption in farm family and Farmer's energy metabolism while in simultaneous interaction with other variables of Y set (Y_1, Y_5), it has clear choice for these 9 exogenous variables. So, in this web of interaction, Energy equivalence of cowdung (Y_2), Crop energy metabolism (Y_3), Energy consumption in farm family(Y_4) and Farmer's energy metabolism (Y_6) will change in the same direction as well as proportion Age(X_1), Education(X_2), Gender ratio(X_3), Family size(X_4), Expenditure allotment(X_{11}), Credit load(X_{12}), Irrigation index(X_{14}), Size of water body(X_{18}) and Cattle holding economics(X_{19}) are changing.

The Cattle holding economics(X_{19}, +0.147) is presenting the highest canonical covariate to suggest that cost effective maintenance of cattle is the important determinant for characterizing the use of cowdung in equivalent of energy, crop energy balances, energy consumption by farmers and their family and so also for other variables in respect of proportionate canonical covariates.

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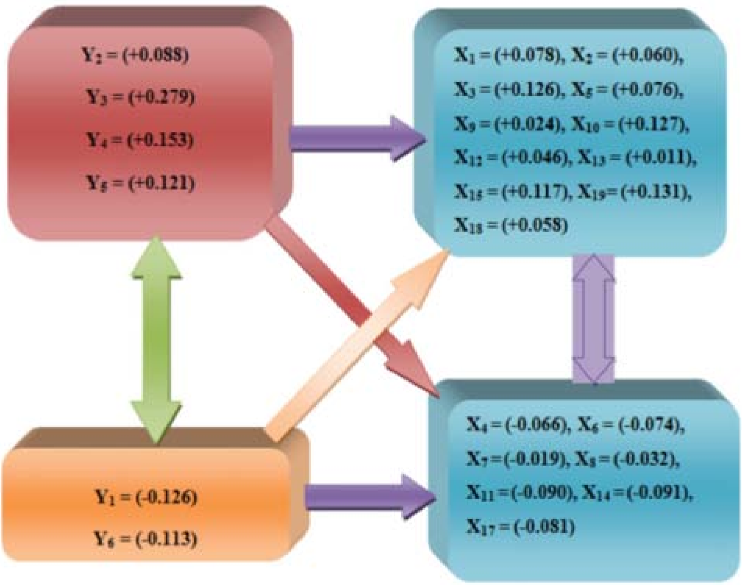
Similarly the left side variables, Cattle energy balance(Y_1) and Perceived impact on energy consumption (Y_5) have got clandestine selection from the right side variable (as both having negative signs direction) to imply that the cattle energy balance and perceived impact on energy consumption has got respective and proportionate weightage contributed by Innovation index(X_6) (-0.131) followed by Family education status(X_5), Occupation(X_7), Family MIS(X_8), Cropping intensity(X_9), Farm size(X_{10}), Annual income(X_{13}), Crop diversity index(X_{15}), Crop energy productivity (X_{16}) and Adoption index(X_{17}) in proportion with the canonical covariates.

Model on Canonical Covariate Analysis: The set wise interaction between 19 independent variables with Perceived Impact on Energy Consumption (Y_5)

MODEL NO 6.31



Revelation: Model 6.31 presents the paradigm on canonical covariates to depict the concurrent interaction amongst and between the left side and

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right side variables. It is interesting to note that the left side variables, Energy equivalence of cowdung (Y_2), Crop energy metabolism (Y_3), Energy consumption in farm family(Y_4) and Perceived impact on energy consumption (Y_5), have hooked up as many as 11 exogenous variables (both X and Y are having the same positive direction) to imply that Energy equivalence of cowdung, Crop energy metabolism, Energy consumption in farm family and Perceived impact on energy consumption while in simultaneous interaction with other variables of Y set (Y_1, Y_6), it has clear choice for these 11 exogenous variables. So, in this web of interaction Energy equivalence of cowdung (Y_2), Crop energy metabolism (Y_3), Energy consumption in farm family(Y_4) and Perceived impact on energy consumption (Y_5) will change in the same direction as well as proportion Age(X_1), Education(X_2), Gender ratio(X_3), Family education status(X_5), Cropping intensity(X_9), Farm size(X_{10}), Credit load(X_{12}), Annual income(X_{13}), Crop diversity index(X_{15}) and Irrigation index(X_{14}), Size of water body(X_{18}) and Cattle holding economics(X_{19}) are changing.

The Cattle holding economics(X_{19}) (+0.131) is presenting the highest canonical covariate to suggest that cost effective maintenance of cattle is the important determinant for characterizing the efficient use of cowdung in equivalent of energy, crop energy balances, energy perception and consumption in family and so also for other variables in respect of proportionate canonical covariates.

Similarly the left side variables, Cattle energy balance(Y_1) and Farmer's energy metabolism (Y_6) have got clandestine selection from the right side variable (as both having negative signs direction) to imply that the Cattle energy balance and Farmer's energy metabolism has got respective and proportionate weightage contributed by Irrigation index(-0.091) followed by Family size(X_4), Innovation index(X_6), Occupation(X_7), Family MIS(X_8), Expenditure allotment(X_{11}) and Adoption index(X_{17}) in proportion with the canonical covariates.

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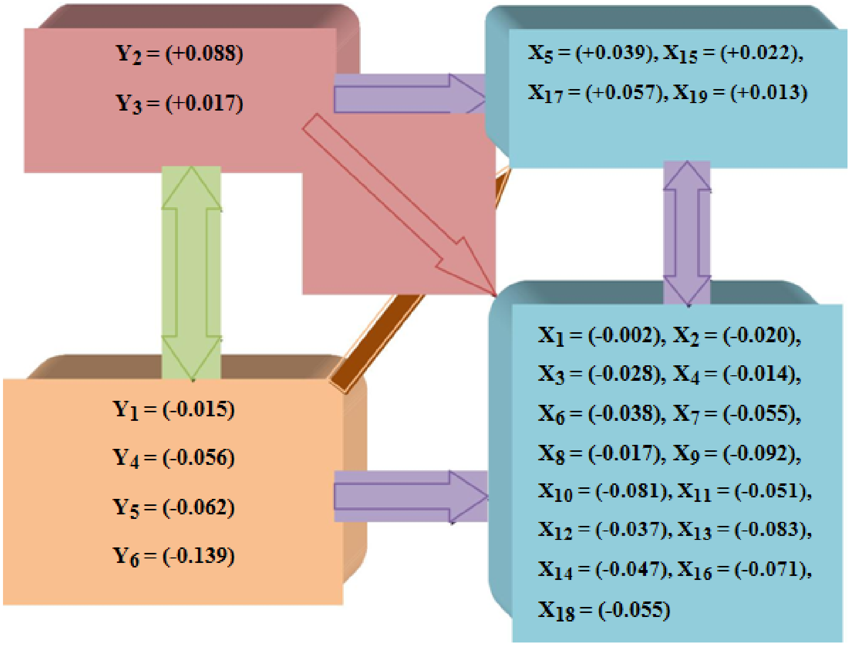
Model on Canonical Covariate Analysis: the set wise interaction between 19 independent variables with Farmers' Energy Metabolism (Y_6)

MODEL NO 6.32



INDEPENDENT VARIABLES

Age(X_1) Education(X_2) Gender ratio(X_3) Family size(X_4) Family education status(X_5) Innovation index(X_6) Occupation(X_7) Family MIS(X_8) Cropping intensity(X_9) Farm size(X_{10}) Expenditure allotment(X_{11}) Credit load(X_{12}) Annual income(X_{13}) Irrigation index(X_{14}) Crop diversity index(X_{15}) Crop energy productivity (X_{16}) Adoption index(X_{17}) Size of water body(X_{18}) Cattle holding economics(X_{19})

DEPENDENT VARIABLES

Cattle energy balance (Y_1) Energy equivalence of cowdung (Y_2) Crop energy metabolism (Y_3) Energy consumption in farm family (Y_4) Perceived impact on energy consumption (Y_5) Farmer's energy metabolism (Y_6)

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Revelation: Model 6.32 presents the paradigm on canonical covariates to depict the concurrent interaction amongst and between the left side and right side variables. It is interesting to note that the left side variables, Cattle energy balance (Y_1) and Crop energy metabolism (Y_3) have hooked up as many as 4 exogenous variables (both X and Y are having the same positive direction) to imply that Farmer's energy metabolism while in simultaneous interaction with other variables of Y set (Y_1, Y_4, Y_5, Y_6), it has clear choice for these 4 exogenous variables. So, in this web of interaction, Cattle energy balance and Crop energy metabolism will change in the same direction as well as proportion Family education status(X_5), Crop diversity index(X_{15}), Adoption index(X_{17}) and Cattle holding economics (X_{19}) are changing.

The Adoption index(X_{17}, +0.057) is presenting the highest canonical covariate to suggest that female participation is the important determinant for characterizing the energy consumption by farmers and so also for other variables in respect of proportionate canonical covariates.

Similarly the left side variables, Cattle energy balance (Y_1), Energy consumption in farm family (Y_4), Perceived impact on energy consumption (Y_5) and Farmer's energy metabolism (Y_6) have got clandestine selection from the right side variable (as both having negative signs direction) to imply that the energy equivalence of cow dung has got respective and proportionate weightage contributed by Cropping intensity (-0.092) followed by Age(X_1), Education(X_2), Gender ratio(X_3), Family size(X_4), Innovation index(X_6), Occupation(X_7), Family MIS(X_8), Farm size(X_{10}), Expenditure allotment(X_{11}), Credit load(X_{12}), Annual income(X_{13}), Irrigation index(X_{14}), Crop energy productivity (X_{16}) and size of water body(X_{18}) in proportion with the canonical covariates.

Table no 6.22 Canonical Discriminant Function Analyses

Sl. No.	Variables	Mean Of Group-I	Mean Of Group-II	L(I) * D(I) value	D Sq Values
1.	Age(X1)	53.64	48.44	0.246	5.457
2.	Education(X2)	6.02	8.32	0.384	8.509

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3.	Gender ratio(X3)	1.47	1.38	-0.010	-0.232
4.	Family size(X4)	4.26	5.88	0.717	**15.883**
5.	Family education status(X5)	6.58	7.92	0.430	9.518
6.	Innovation index(X6)	14401.96	14141.18	0.003	0.063
7.	Occupation(X7)	6.09	6.16	0.0092	0.203
8.	Family MIS(X8)	2.76	2.56	0.127	2.804
9.	Cropping intensity(X9)	202.58	272.66	-0.086	-1.907
10.	Farm size(X10)	62.57	86.56	0.303	6.707
11.	Expenditure allotment(X11)	35.95	34.96	0.060	1.320
12.	Credit load(X12)	3566.00	2919.00	0.132	2.931
13.	Annual income(X13)	48663.30	57575.32	0.056	1.234
14.	Irrigation index(X14)	0.69	0.87	1.204	**26.678**
15.	Crop diversity index(X15)	0.02	0.06	0.187	4.146
16.	Crop energy productivity (X16)	88.84	48.70	0.502	**11.116**
17.	Adoption index(X17)	1.56	1.83	0.132	2.926

18.	Size of Water body(X18)	50.96	90.76	0.123	2.714
19.	Cattle holding economics(X19)	9155.40	9916.40	-0.003	-0.068
20.	Cattle Energy Balance (Y1)	6470.52	6470.52	0.000	0.000
21.	Energy Equivalence of Cowdung (Y2)	42.58	43.68	0.002	3.938
22.	Crop Energy Metabolism (Y3)	-4.31	-4.16	-0.001	-0.937
23.	Energy Consumption in Farm Family (Y4)	0.32	0.36	0.034	85.670
24.	Perceived Impact on Energy Consumption (Y5)	6.78	6.81	0.004	10.380
25.	Farmers' Energy Metabolism (Y6)	142464.6 9	142636.23	0.001	0.950

Result: The canonical discriminant function analysis has identified these three variables i.e. Irrigation index (X_{14}) (26.678), Family size(X_4) (15.883), Crop energy productivity (X_{16}) (11.116), contributing substantially to create a difference in terms of social ecological behaviour.

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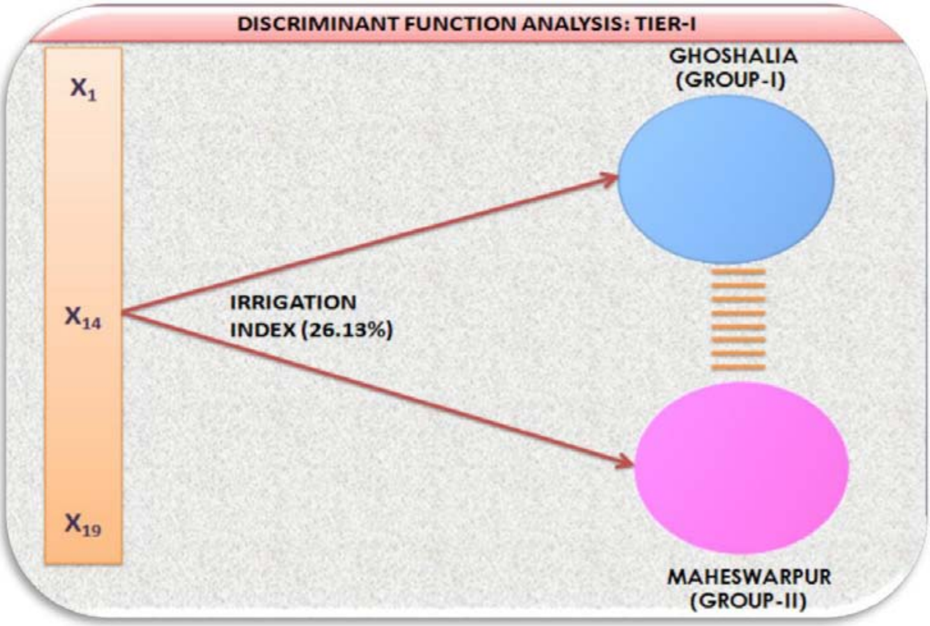
Model- 6.33 Canonical Discriminant Function Analysis: Tire-I



Revelation: Canonical Discriminant function has identified the solitary variable, irrigation index(X_{14}), having substantive discriminatory efficacy to make a difference between two research locale with their respective means.

This is the single most important intervention which has made a structural as well as functional difference between these two villages i.e. Ghoshalia and Maheswarpur. Irrigation invites application of fertilizer, consumption of electricity and a faster transformation in the character of farm entrepreneurship energy by becoming a polymorphic source of transformation, irrigation can't stay a long way from consuming energy and its relegated change.

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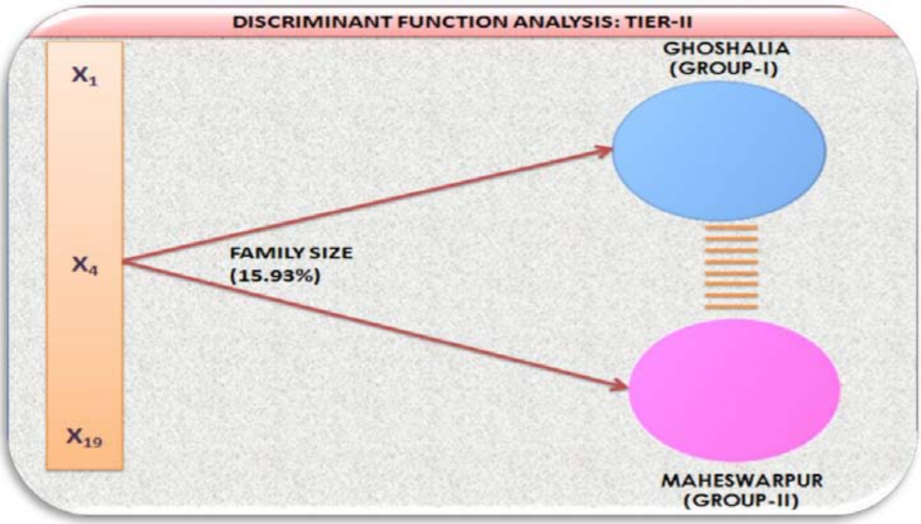
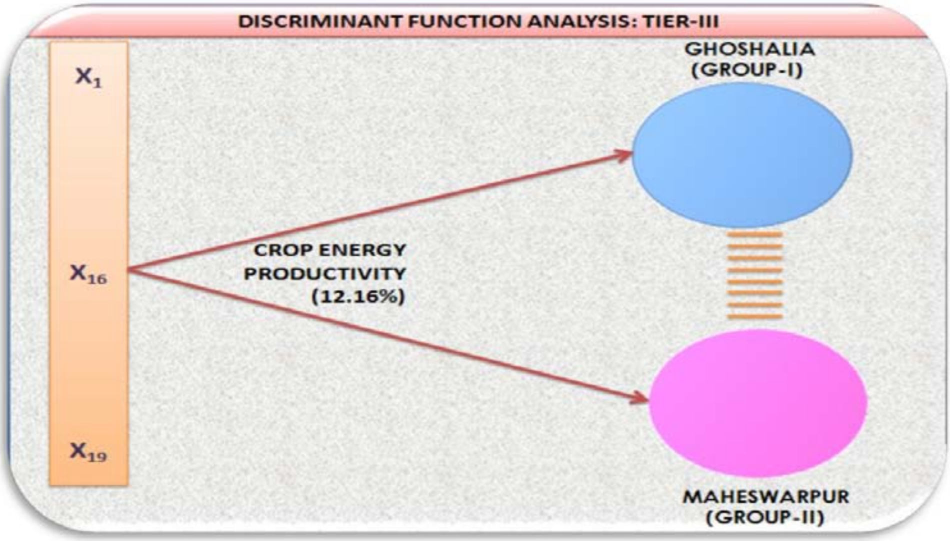
Model- 6.34 Canonical Discriminant Function Analysis: Tire-II



Revelation: The Family size in one village is bigger because of its domination of minority population and hence, has offered a socio-cultural distance between these two villages (Ghoshalia and Maheswarpur)

Model- 6.35 Canonical Discriminant Function Analysis: Tire-III



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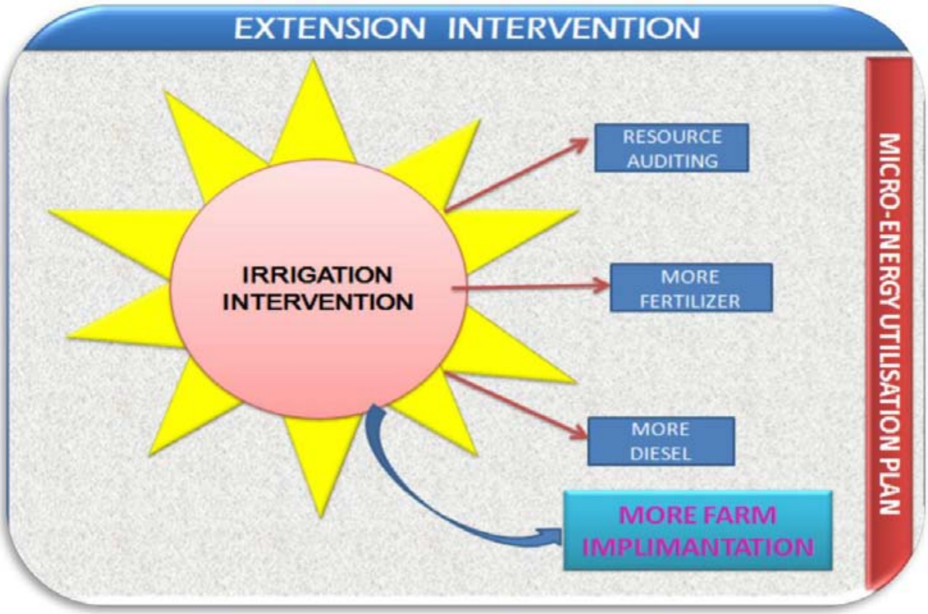
Revelation: The crop energy productivity has also been a character of discernible differences between these two villages which may spear a new research in cataloguing villages with differential crop energy balances.

MODEL - 6.36 THE EXTENSION INTERVENTION



Revelation: The most important findings of the study has been its identification of a solitary variable i.e. irrigation index which have made a perceptible distance between these two villages. Irrigation as an intervention can diverge and begets scores of congenital effects for example Resource auditing, Fertilizer optimization, Consumption of diesel and more mechanization. All these sub-processes may move isochronously to invite further a composite approach of, input-method-concept-planning management. All these having been done, this will generate a micro policy to be applied and adopted in the transforming farm ecology.