Chapter–6

Empirical Analysis

This is the more critical and empirical interpretation of the research work to vindicate the research objectives. This chapter has entertained complex statistical results into attractive models and supported by crucial revelation. The brevity of interpretation has added value and increased the readability to a higher elevation……..

Table 6 1: Descriptive statistics of independent variables with respected to Mean, Standard Deviation values, Coefficient of variance.

Sl. No	Variables	Mean	SD	CV
1.	Age(X1)	45.56	11.59	25.44
2.	Education(X2)	9.98	2.86	28.65
3.	Family size(X3)	5.68	2.95	51.93
4.	Cropping intensity(X4)	126.40	22.47	17.77
5.	Total holding size(X5)	2.38	2.06	86.55
6.	Total home stead area(X6)	0.56	0.40	71.42
7.	Total area under horticultural crops(X7)	1.50	1.60	106.66
8.	Total area under field crops (X8)	6.97	3.76	53.94
9.	Irrigation status(X9)	0.78	0.10	12.82
10.	Organic manure applied /unit area(X10)	713.00	152.80	21.43
11.	Green leaf manure applied/unit area (X11)	8.06	3.89	48.26
12.	Bio-Fertilizer applied /unit area (X12)	0.16	0.05	31.25

13.	Compost applied/unit area (X13)	46.4	11.56	24.91
14.	Organic pesticides applied/unit area(X14)	10.18	2.13	20.92
15.	No of cattle's (X15)	3.22	1.68	52.17
16.	Total amount of cow dung produce(X16)	29.22	20.91	71.56
17.	Avg. electric bill for Domestic purpose in month(X17)	29.86	16.21	54.28
18.	Avg. electric bill for Field purpose in month(X18)	15.69	13.08	83.36
19.	Avg. consumption for daily requirements(X19)	15.57	5.92	38.02
20.	Exposure to media(X20)	2.85	1.32	46.31
21.	Avg. expenditure allotted in month(X21)	1359.68	852.20	62.67

Table 6.2: Coefficient of correlation(r): Productivity of organic paddy (Y_1) vs. 21 independent variables(X_1-X_{21}).

Sl. No	Variables	r value	Remarks
1	Age (X1)	-0.172	
2	Education (X2)	-0.101	
3	Family size (X3)	0.803	**
4	Cropping intensity (X4)	0.018	
5	Total holding size (X5)	0.905	**
6	Total home stead area (X6)	-0.202	
7	Total area under horticultural crops (X7)	-0.097	
8	Total area under field crops (X8)	0.155	
9	Irrigation status (X9)	0.019	
10	Organic manure application (X10)	0.215	
11	Green leaf manure application (X11)	0.940	
12	Bio-Fertilizer application (X12)	0.008	
13	Compost application (X13)	0.033	
14	Organic pesticides application (X14)	0.200	
15	No of cattles (X15)	0.093	

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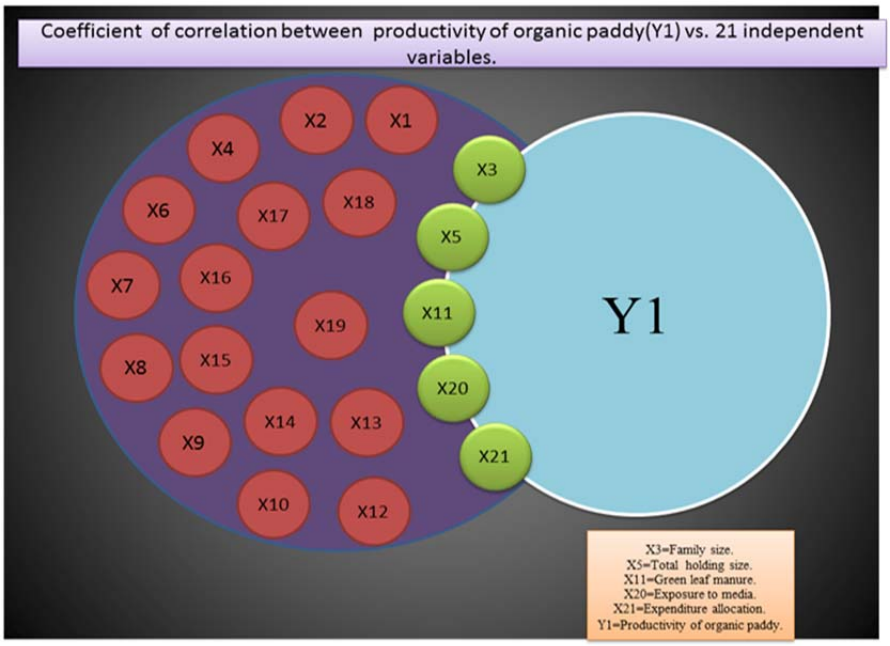
16	Total amount of cow dung produce (X16)	-0.087	
17	Avg. electric bill for Domestic purpose (X17)	-0.062	
18	Avg. electric bill for Field purpose (X18)	0.020	**
19	Avg. consumption for daily requirements (X19)	-0.201	
20	Exposure to media (X20)	0.798	
21	Expenditure allocation (X21)	0.919	
	r>0.220 significant at p=0.05(*) r>0.287 significant at p=0.01(**)		

Table- 2: shows the co-efficient of correlation between productivity of organic paddy (Y_1) and 21 independent variables.

Results: It is found that the variables, Family size (X_2), Total holding size (X_5), Green leaf manure application (X_{11}), Exposure to media (X_{20}), Expenditure allocation (X_{21}), have exerted positive and significant correlation with the dependent variable, productivity of organic paddy (Y_1).

MODEL - 1



Revelation: Higher holding size with higher cropping intensity increases production and productivity of organic paddy. Application of higher green leaf manure enhances organic paddy productivity by enriching the soil quality. High expenditure allocation on health, farming, education and more exposure to media, make farmer more cosmopolite through widening their knowledge, which enables them to get more production.

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Table 6. 3: Coefficient of correlation(r): Productivity of inorganic paddy (Y_2) vs. 21 independent variables(X_1-X_{21}).

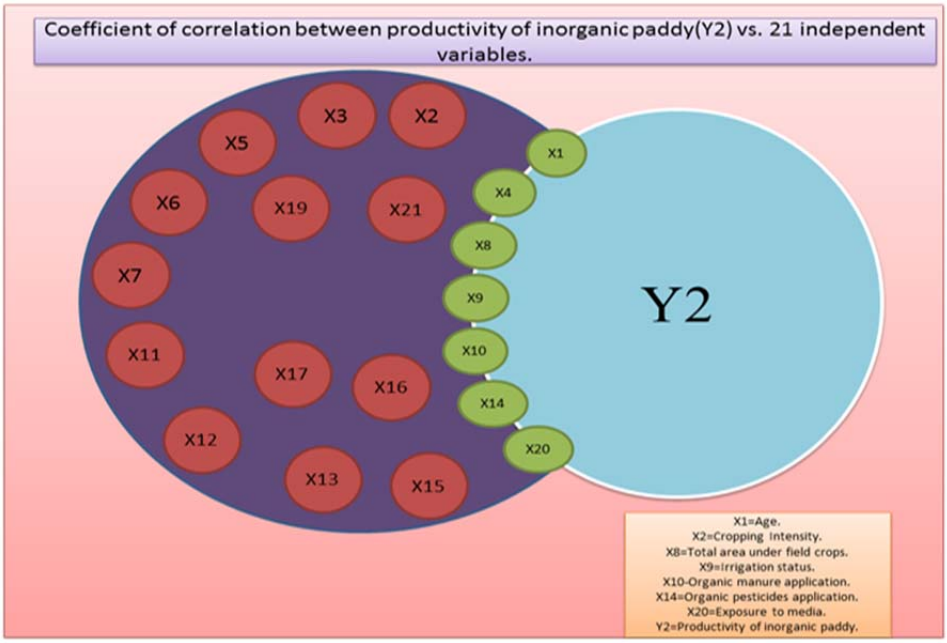
Sl. No	Variables	r value	Remarks
1	Age (X1)	0.245	*
2	Education (X2)	-0.065	
3	Family size (X3)	0.142	
4	Cropping intensity (X4)	0.758	**
5	Total holding size (X5)	0.037	
6	Total home stead area (X6)	-0.073	
7	Total area under horticultural crops (X7)	0.112	
8	Total area under field crops (X8)	0.909	**
9	Irrigation status (X9)	0.246	*
10	Organic manure application (X10)	-0.803	**
11	Green leaf manure application (X11)	-0.171	
12	Bio-Fertilizer application (X12)	0.027	
13	Compost application (X13)	0.031	
14	Organic pesticides application (X14)	0.803	**
15	No of cattles (X15)	-0.140	
16	Total amount of cow dung produce(X16)	0.102	
17	Avg. electric bill for Domestic purpose (X17)	-0.064	
18	Avg. electric bill for Field purpose (X18)	0.220	
19	Avg. consumption for daily requirements (X19)	0.175	
20	Exposure to media (X20)	0.932	**
21	Expenditure allocation (X21)	-0.091	
	r>0.220 significant at p=0.05(*) r>0.287 significant at p=0.01(**)		

Table- 3 shows the co-efficient of correlation between productivity of inorganic paddy (Y1) and 21 independent variables.

Results: It is found that the variables like Age (X_1),Cropping intensity (X_4),Total area under field crops(X_8), Organic pesticide application (X_{14}) and Exposure to media (X_{20}) have exerted positive, while variable, organic

manure application (X_{10}) has exerted negative significant correlation with the dependent variable, productivity of inorganic paddy (Y_2).

MODEL- 2



Revelation: Generally traditional farmers don't want to follow organic farming against inorganic. More cropping intensity results more productivity. Farmers prefer chemical fertilizer instead of organic manure to get higher productivity. With the development of agriculture, farmers are gradually adopting to organic pesticides application. As per farmers' perception, application of organic pesticides effectively controls the spread of insect-pest and increases productivity level. Exposure to media enriches farmers with new technologies, that leads to increase in productivity.

Table 6. 4: Coefficient of correlation(r): Market value of organic paddy (Y_3) vs. 21 independent variables(X_1-X_{21}).

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Sl. No	Variables	r value	Remarks
1	Age (X1)	-0.172	
2	Education (X2)	-0.101	
3	Family size (X3)	0.146	
4	Cropping intensity (X4)	0.855	**
5	Total holding size (X5)	0.018	
6	Total home stead area (X6)	-0.195	
7	Total area under horticultural crops (X7)	-0.202	
8	Total area under field crops (X8)	0.097	
9	Irrigation status (X9)	0.155	
10	Organic manure application (X10)	-0.019	
11	Green leaf manure application (X11)	0.940	**
12	Bio-Fertilizer application (X12)	0.798	**
13	Compost application (X13)	0.215	
14	Organic pesticides application (X14)	-0.140	
15	No of cattles (X15)	0.803	**
16	Total amount of cow dung produce (X16)	0.008	
17	Avg. electric bill for Domestic purpose (X17)	0.033	
18	Avg. electric bill for Field purpose (X18)	0.200	
19	Avg. consumption for daily requirements (X19)	0.093	
20	Exposure to media (X20)	0.919	**
21	Expenditure allocation (X21)	-0.087	
	r>0.220 significant at p=0.05(*) r>0.287 significant at p=0.01(**)	-0.062	

Table- 4 shows the co-efficient of correlation between market value of organic paddy (Y3) and 21 independent variables.

Results: It is found that the variables like Cropping intensity (X_4), Green leaf manure application (X_{11}), Bio-Fertilizer application (X_{12}), No .of cattle's (X_{15}) and Exposure to media (X_{20}) have exerted positive and

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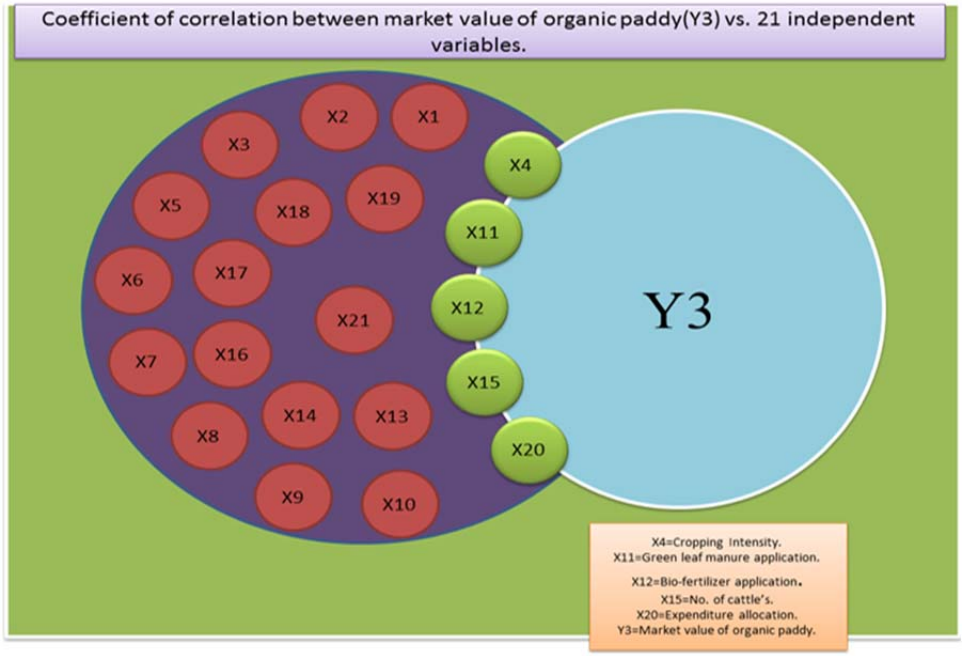
significant correlation with the dependent variable, market value of organic paddy (Y_3).

MODEL - 3



Revelation: Higher cropping intensity, more green leaf manure and bio-fertilizer application, increase the production and quality of organic paddy which derives higher market value. More the no. of cattle, the more is the production of cow dung which is use as a better import for higher production. Exposure to media provides various market information, which enables the farmer to get proper market value of organic paddy.

Table 6. 5: Coefficient of correlation(r): Return of the product from Organic paddy (Y_4) vs. 21 independent variables(X_1-X_{21}).

Sl. No	Variables	r value	Remarks
1	Age (X1)	-0.206	
2	Education (X2)	-0.122	
3	Family size (X3)	0.759	**
4	Cropping intensity (X4)	0.201	
5	Total holding size (X5)	0.029	
6	Total home stead area (X6)	-0.200	
7	Total area under horticultural crops (X7)	-0.305	*
8	Total area under field crops (X8)	-0.149	
9	Irrigation status (X9)	-0.016	
10	Organic manure application (X10)	0.240	*
11	Green leaf manure application (X11)	0.758	**
12	Bio-Fertilizer application (X12)	0.034	
13	Compost application (X13)	0.241	*
14	Organic pesticides application (X14)	0.940	**
15	No of cattles (X15)	0.925	**
16	Total amount of cow dung produce(X16)	-0.141	
17	Avg. electric bill for Domestic purpose (X17)	0.022	
18	Avg. electric bill for Field purpose (X18)	0.153	
19	Avg. consumption for daily requirements(X19)	0.168	
20	Exposure to media(X20)	0.096	
21	Expenditure allocation (X21)	0.940	**
	r>0.220 significant at p=0.05(*) r>0.287 significant at p=0.01(**)		

Table- 5 shows the co-efficient of correlation between return of the product from organic paddy (Y4) and 21 independent variables.

Results: It is found that the variables like Family size (X_3), Organic manure application (X_{10}), Green leaf manure application (X_{11}), Compost application

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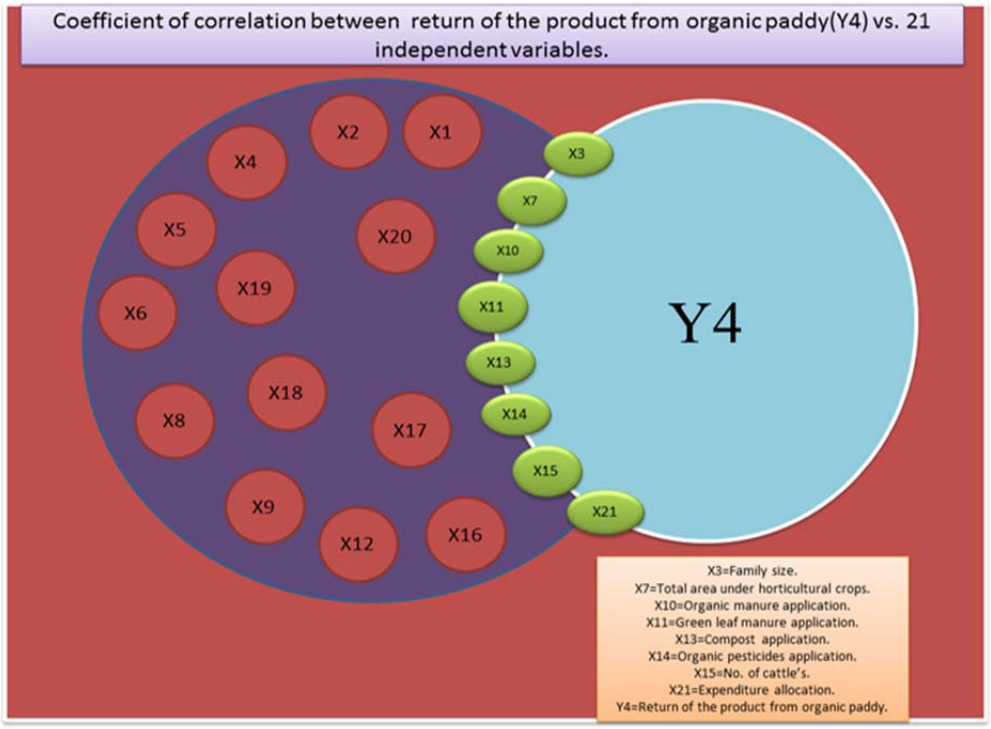
(X_{13}), Organic pesticides application (X_{14}), No. of cattle's (X_{15}), Expenditure allocation (X_{21}) have exerted positive, while variable, Total area under horticultural crops(X_7) has exerted negative significant correlation with the dependent variable, return of the product from organic paddy (Y_4).

MODEL - 4



Revelation: Bigger the family size more is the involvement in farming. Application of organic manure, pesticides, compost, increases high production and provides high return from organic paddy. Having more no. of cattle adds some extra proportion to the net return. Higher expenditure allocation has a positive effect on the return from organic paddy.

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Table 6.6: Coefficient of correlation(r): Return of the product from inorganic paddy (Y_5) vs. 21 independent variables (X_1-X_{21})

Sl. No	Variables	r value	Remarks
1	Age (X1)	-0.188	
2	Education (X2)	0.123	
3	Family size (X3)	0.798	**
4	Cropping intensity(X4)	0.024	
5	Total holding size(X5)	0.039	
6	Total home stead area(X6)	-0.146	
7	Total area under horticultural crops (X7)	-0.161	
8	Total area under field crops (X8)	0.798	**
9	Irrigation status (X9)	-0.161	
10	Organic manure application (X10)	0.046	
11	Green leaf manure application (X11)	0.253	*
12	Bio-Fertilizer application (X12)	-0.053	
13	Compost application (X13)	-0.090	
14	Organic pesticides application (X14)	0.052	
15	No of cattle's (X15)	-0.088	
16	Total amount of cow dung produce(X16)	0.932	**
17	Avg. electric bill for Domestic purpose (X17)	0.244	*
18	Avg. electric bill for Field purpose (X18)	0.138	
19	Avg. consumption for daily requirements (X19)	-0.060	
20	Exposure to media (X20)	0.759	**
21	Expenditure allocation (X21)	0.950	**
	r>0.220 significant at p=0.05(*) r>0.287 significant at p=0.01(**)		

Table- 6 shows the co-efficient of correlation between return of the product from inorganic paddy (Y4) and 21 independent variables.

Results : It is found that the variables like Family size (X_3),Total area under fields crops (X_8), Green leaf manure application (X_{11}), Total amount of cow

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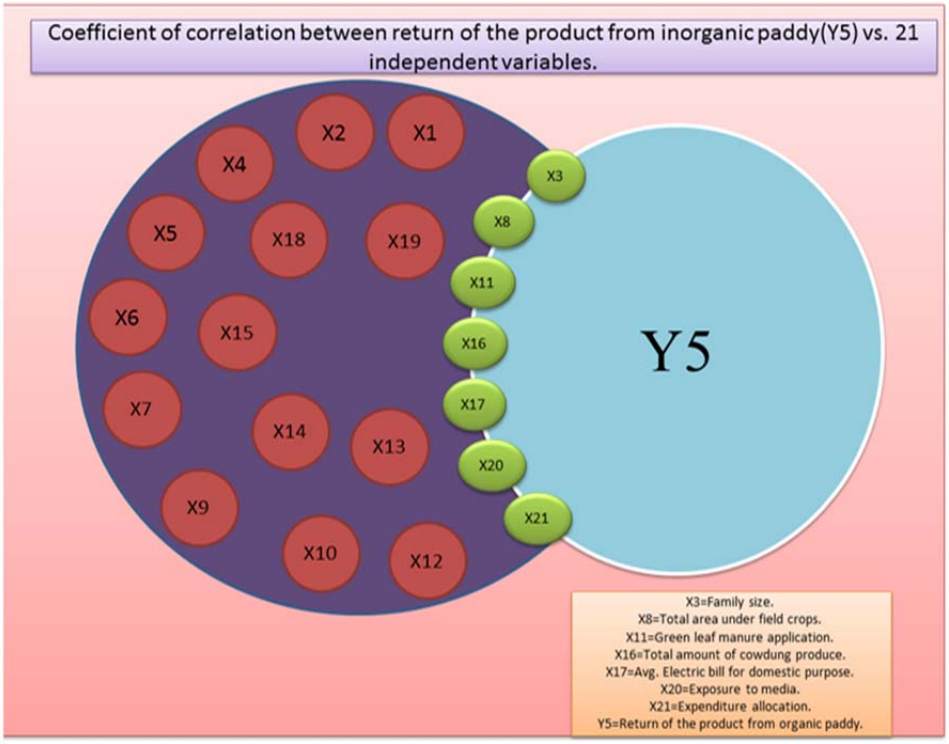
dung produce (X_{16}), Avg. electric bill for domestic purpose (X_{17}), Exposure to media (X_{20}), Expenditure allocation (X_{21}) have exerted positive and significant correlation with the dependent variable, return of the product from inorganic paddy (Y_5)

MODEL - 5



Revelation: Bigger the family size more is the involvement in farming. More area under field crops yields more production. Farmer prefers application of green leaf manure for enriching soil health, increases high production and provides high return from inorganic paddy. More use of cow dung adds a better import for higher production. Share of power

consumption for agricultural purpose is increasing which provides more income due to more modernization of agriculture. Exposure to media helps in widening the knowledge of farmer which leads to application of new technology in farming. Higher expenditure allocation has a positive effect on the return from inorganic paddy.

Table 6.7: Coefficient of correlation(r): Return of the product from mixed farming both org. and inorganic (Y_6) vs. 21 independent variables (X_1-X_{21}).

Sl. No	Variables	r value	Remarks
1	Age (X1)	0.209	
2	Education (X2)	-0.142	
3	Family size (X3)	0.110	
4	Cropping intensity (X4)	0.919	**
5	Total holding size (X5)	0.037	
6	Total home stead area (X6)	-0.182	
7	Total area under horticultural crops (X7)	-0.165	
8	Total area under field crops (X8)	-0.102	
9	Irrigation status (X9)	0.263	*
10	Organic manure application (X10)	0.919	**
11	Green leaf manure application (X11)	0.043	
12	Bio-Fertilizer application (X12)	0.085	
13	Compost application (X13)	-0.120	
14	Organic pesticides application (X14)	0.041	
15	No of cattle's (X15)	0.022	
16	Total amount of cow dung produce (X16)	0.909	**
17	Avg. electric bill for Domestic purpose (X17)	0.223	*
18	Avg. electric bill for Field purpose (X18)	0.127	
19	Avg. consumption for daily requirements (X19)	-0.078	
20	Exposure to media(X20)	0.925	**
21	Expenditure allocation (X21)	0.950	**
	r>0.220 significant at p=0.05(*) r>0.287 significant at p=0.01(**)		

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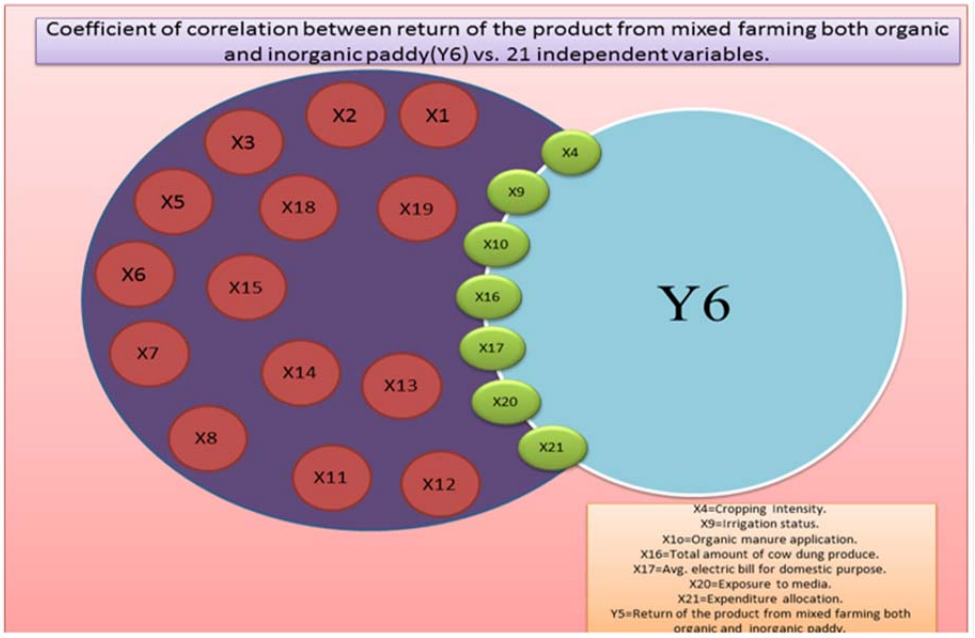
Table- 7 shows the co-efficient of correlation between return of the product from mixed farming both organic and inorganic paddy (Y5) and 21 independent variables.

Results : It is found that the variables like Cropping intensity (X_4),Irrigation status (X_9)Organic manure application (X_{10}),Green leaf manure application (X_{11}), Total amount of cow dung produce (X_{16}), Avg. electric bill for domestic purpose (X_{17}), Exposure to media (X_{20}), Expenditure allocation (X_{21}) have exerted positive and significant correlation with the dependent variable, return of the product from mixed farming both organic and inorganic paddy(Y_6).

MODEL - 6



Revelation: Higher cropping intensity, irrigation status, more green leaf manure and organic manure application, increase high production and

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provides high return from mixed farming both (organic and inorganic paddy) . More use of cow dung adds a better import for higher production. Share of power consumption for agricultural purpose is increasing which provides more net return from mixed farming. Exposure to media helps in widening the knowledge of farmer which leads to application of new technology in farming. Higher expenditure allocation has a positive effect on the return from mixed farming.

Table 6.8: Coefficient of correlation(r): Livelihood from organic paddy (Y) vs. 21 independent variables (X_1-X_{21}).

Sl. No	Variables	r value	Remarks
1	Age (X1)	-0.006	
2	Education (X2)	0.271	*
3	Family size (X3)	-0.100	
4	Cropping intensity (X4)	-0.017	
5	Total holding size (X5)	0.056	
6	Total home stead area (X6)	0.037	
7	Total area under horticultural crops (X7)	-0.105	
8	Total area under field crops (X8)	-0.147	
9	Irrigation status (X9)	0.028	
10	Organic manure application (X10)	0.030	
11	Green leaf manure application (X11)	0.026	
12	Bio-Fertilizer application (X12)	0.165	
13	Compost application (X13)	0.036	
14	Organic pesticides application (X14)	0.017	
15	No of cattle's (X15)	0.266	*
16	Total amount of cow dung produce (X16)	-0.106	
17	Avg. electric bill for Domestic purpose (X17)	0.178	
18	Avg. electric bill for Field purpose (X18)	0.135	
19	Avg. consumption for daily requirements (X19)	0.120	
20	Exposure to media(X20)	0.178	

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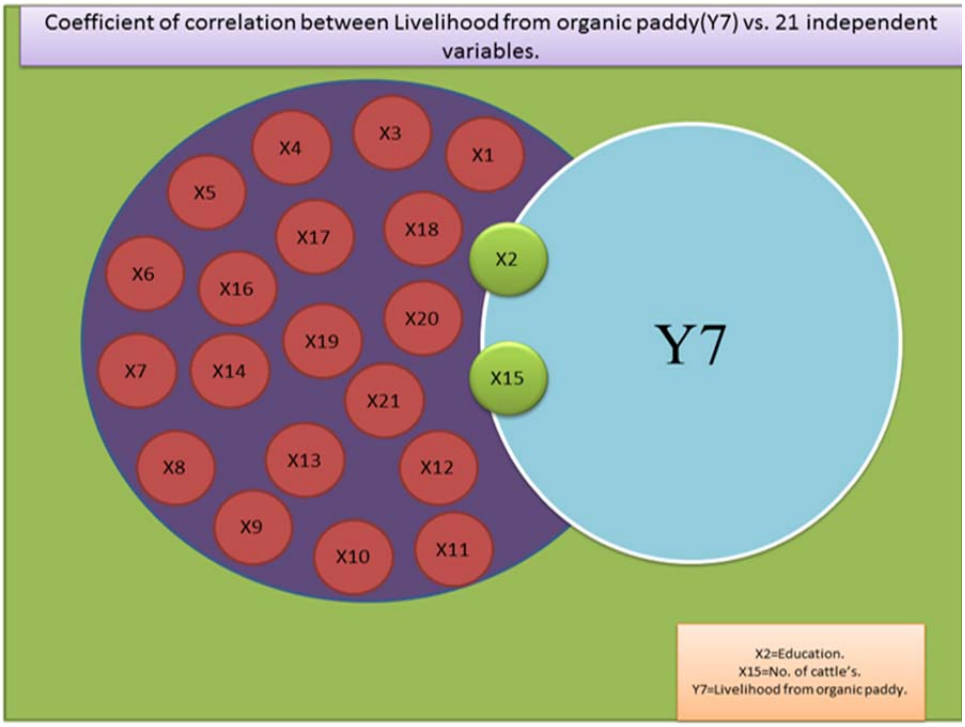
21	Expenditure allocation (X21)	0.120	
	r>0.220 significant at p=0.05(*) r>0.287 significant at p=0.01(**)		

Table- 8 shows the co-efficient of correlation between livelihood from organic paddy (Y7) and 21 independent variables.

Results : It is found that the variables like Education (X_2) No .of cattles (X_{15}) have exerted positive and significant correlation with the dependent variable, livelihood from organic paddy (Y_7).

MODEL - 7



Revelation: Educated farmer prefers modern agriculture such as mixed farming, integrated farming system, organic farming, etc for their better

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income and better livelihood. Organic farming provides better production with better market value. Having more no. of cattle's provides quality input for organic farming and adds extra income to farmers' livelihood. Literate farmers prefer organic for their better livelihood.

Table 6.9: Multiple Regression Analysis: Productivity of organic paddy (Y_1) vs. 21 causal variables ($X_1 – X_{21}$).

Multiple r sq- 0.370

Sl. No.	Variables	Beta	Reg. coef. B	S, error B	t-value	Remarks
1	Age (X1)	.040	0.004	1.927	0.021	
2	Education (X2)	-3.897	-0.104	8.025	-0.486	
3	Family size (X3)	-12.311	-0.340	11.463	-1.074	
4	Cropping intensity(X4)	0.170	0.036	0.968	0.176	
5	Total holding size (X5)	-4.564	-0.088	12.187	-0.375	
6	Total home stead area (X6)	-48.168	-0.182	70.482	-0.683	
7	Total area under horticultural crops (X7)	-4.059	-0.061	19.145	-0.212	
8	Total area under field crops (X8)	11.048	0.389	7.255	1.523	
9	Irrigation status (X9)	-108.363	-0.102	219.362	-0.494	
10	Organic manure application (X10)	2.253	0.362	0.156	2.627	*
11	Green leaf manure application (X11)	0.147	0.005	5.719	0.026	
12	Bio-Fertilizer application (X12)	-206.993	-0.099	472.766	-0.438	
13	Compost application (X13)	-1.833	-0.198	2.670	-0.686	

14	Organic pesticides application (X14)	13.386	0.267	11.470	1.167	
15	No of cattles (X15)	25.104	0.395	22.165	1.133	
16	Total amount of cowdung produce(X16)	-2.190	-0.428	1.959	-1.118	
17	Avg. electric bill for Domestic purpose (X17)	-1.190	-0.180	1.654	-0.720	
18	Avg. electric bill for Field purpose (X18)	0.779	0.095	1.836	0.424	
19	Avg. consumption for daily requirements (X19)	-7.305	-0.404	5.600	-1.304	
20	Exposure to media(X20)	0.649	0.008	18.386	0.035	
21	Expenditure allocation (X21)	0.005	0.043	0.034	0.159	
	t value>2.048 significant at p=0.05(*)					

Table 9 presents the Multiple Linear Regression Analysis to estimate that the respective causal contribution of 21 exogenous variables on the dependent variable, production of organic paddy (Y_1).

Results: It has been found that the variables Organic manure application (X_{10}) has recorded a significant causal-effect impact on production of organic paddy (Y_1)

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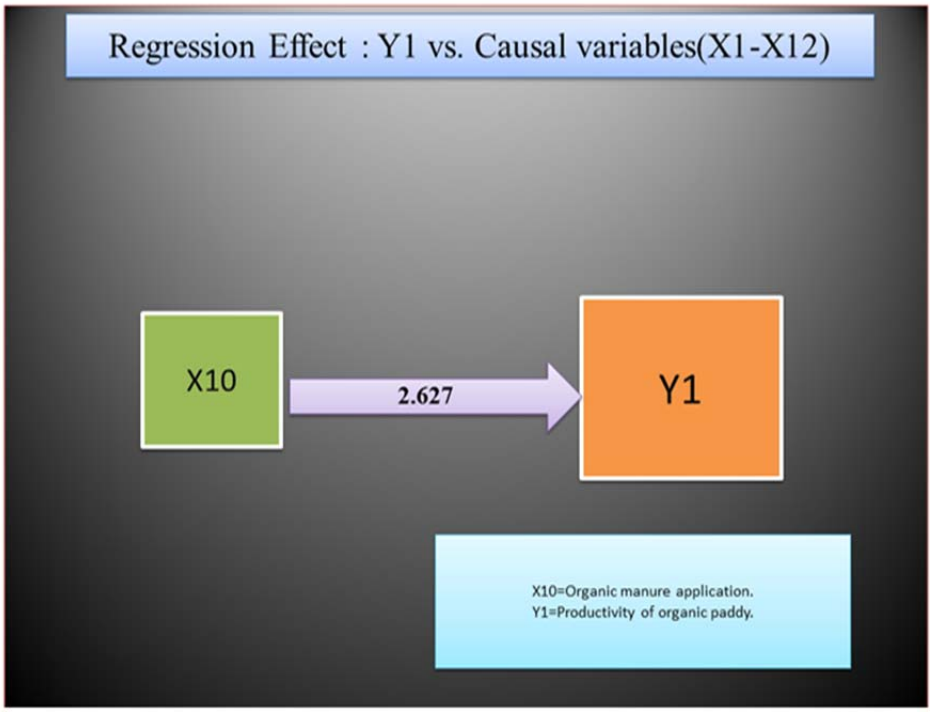
MODEL - 8



Revelation: Organic manure is the most important input for organic farming. So, this causal-effect relationship highly justifies the cause-effect interaction**.**

So, the variables organic manure application (X_{10}) can be indicator variables to measure the production of organic paddy (Y_1). r^2 value being 0.370 it is to conclude that 37 percent of the variability embedded with the consequent variable production of organic paddy (Y_1) has been explained with the combination of the 21 causal variables.

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Table 6.10: Multiple Regression Analysis: Productivity of inorganic paddy (Y_2) vs. 21 causal variables ($X_1 – X_{21}$).

Multiple r sq- 0.476

Sl. No.	Variables	Beta	Reg. coef. B	S, error B	t-value	Remarks
1	Age (X1)	-0.712	-0.062	2.185	-0.326	
2	Education (X2)	-2.703	-0.058	9.102	-0.297	
3	Family size (X3)	-21.873	-0.485	13.002	-1.682	
4	Cropping intensity (X4)	0.519	0.088	1.098	0.473	
5	Total holding size (X5)	-3.101	-0.048	13.822	-0.224	
6	Total home stead area (X6)	-45.759	-0.139	79.943	-0.572	
7	Total area under horticultural crops (X7)	-6.865	-0.083	21.715	-0.316	
8	Total area under field crops (X8)	18.797	0.532	8.229	2.284	*
9	Irrigation status (X9)	-196.295	-0.149	248.810	-0.789	
10	Organic manure application (X10)	0.115	0.132	0.177	0.650	
11	Green leaf manure application (X11)	-0.557	-0.166	6.487	-0.086	
12	Bio-Fertilizer application (X12)	429.609	0.166	536.231	0.801	
13	Compost application (X13)	-2.805	-0.244	3.029	-0.926	
14	Organic pesticides application (X14)	18.520	0.297	13.010	1.424	
15	No of cattle(X15)	54.095	0.684	25.141	2.152	*
16	Total amount of cow dung produce (X16)	-3.741	-0.588	2.222	-1.683	

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17	Avg. electric bill for Domestic purpose (X17)	-1.612	-0.196	1.876	-0.859	
18	Avg. electric bill for Field purpose (X18)	0.732	0.072	2.083	0.351	
19	Avg. consumption for daily requirements (X19)	-4.175	-0.186	6.352	-0.657	
20	Exposure to media(X20)	-24.385	-0.243	20.854	-1.169	
21	Expenditure allocation (X21)	-0.099	-0.060	0.039	-0.242	
	t value>2.048 significant at p=0.05(*)					

The Table 10 presents the Multiple Linear Regression Analysis to estimate that the respective causal contribution of 21 exogenous variables on the dependent variable, production of inorganic paddy (Y_2).

Results: It has been found that the variables Total area under field crops (X_8) and No. of cattles (X_{15}) has recorded a significant causal-effect impact on production of inorganic paddy (Y_2).

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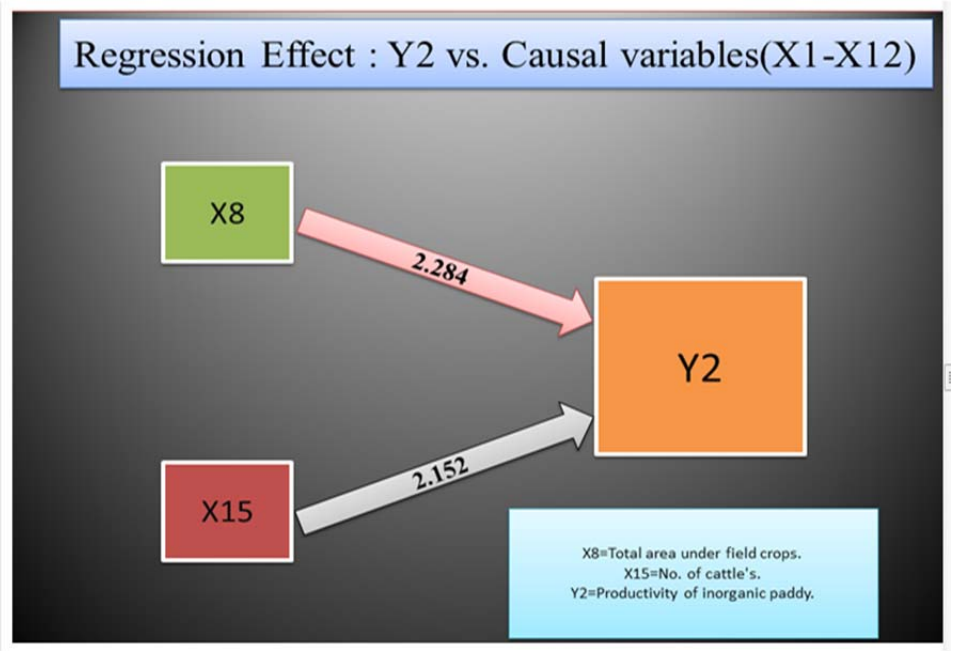
MODEL - 9



Revelation: Land as a resource still has got strong determining impact on the productivity. When land resources are ample, risk are shared and harvests are more secure.

No. of cattles has gone proportionate with the volume of cow dung vis-à-vis organic matter production. So, a farmer following organic farming is also characterized with owner of large no. of cattles.

So, the variable total area under field crops (X_8) and no. of cattles (X_{15}) can be indicator variables to measure the production of inorganic paddy (Y_2). r^2 value being 0.476 it is to conclude that 47.6 percent of the variability embedded with the consequent variable production of inorganic paddy (Y_2) has been explained with the combination of the 21 causal variables**.**

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Table 6.11: Multiple Regression Analysis: Market value of organic paddy (Y_3) vs. 21 causal variables ($X_1 – X_{21}$).

Multiple r sq - 0.370

Sl. No.	Variables	Beta	Reg. coef. B	S, error B	t-value	Remarks
1	Age (X1)	0.553	0.004	26.492	0.021	
2	Education (X2)	-53.584	-0.104	110.338	-0.486	
3	Family size (X3)	-169.276	-0.340	157.621	-1.074	
4	Cropping intensity (X4)	2.337	0.036	13.307	0.176	
5	Total holding size (X5)	-62.762	-0.086	167.564	-0.375	
6	Total home stead area(X6)	-662.310	-0.182	969.123	-0.683	
7	Total area under horticultural crops (X7)	-55.817	-0.061	263.247	-0.212	
8	Total area under field crops (X8)	151.907	0.389	99.754	1.523	
9	Irrigation status (X9)	-1489.993	-0.102	3016.232	-0.494	
10	Organic manure application (X10)	3.482	0.362	2.140	1.627	
11	Green leaf manure application (X11)	2.019	0.005	78.640	0.026	
12	Bio-Fertilizer application (X12)	-2846.156	-0.099	6500.531	-0.438	
13	Compost application (X13)	-25.200	-0.198	36.717	-0.686	
14	Organic pesticides application (X14)	184.053	0.267	157.711	1.167	
15	No of cattles(X15)	345.185	0.395	304.773	1.133	
16	Total amount of cow dung produce(X16)	-30.116	-0.428	26.938	-1.118	

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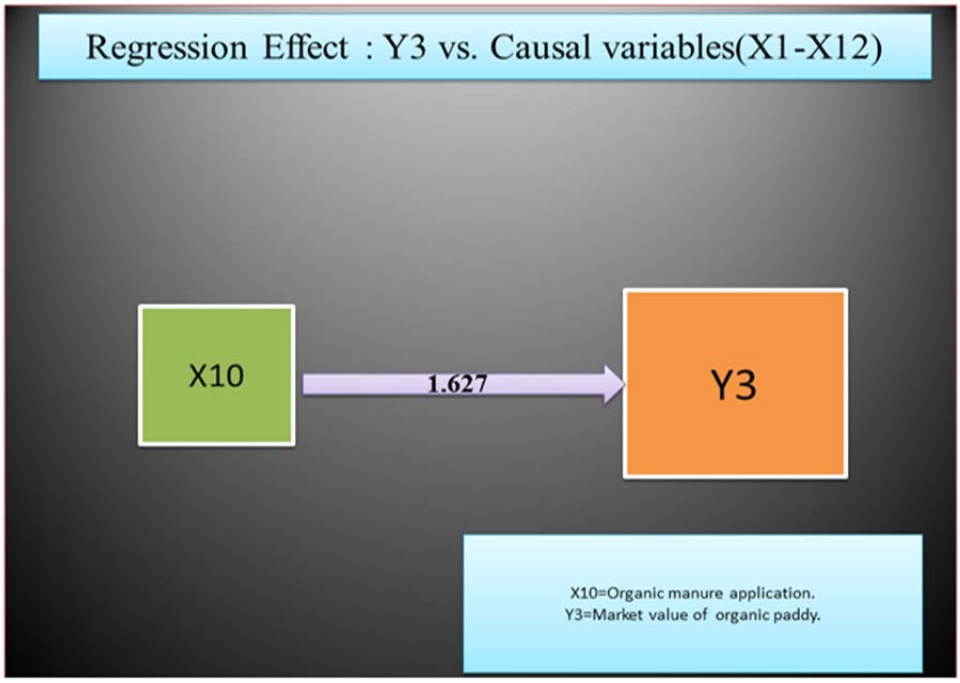
17	Avg. electric bill for Domestic purpose (X17)	-16.369	-0.180	22.741	-0.720	
18	Avg. electric bill for Field purpose (X18)	10.713	0.095	25.249	0.424	
19	Avg. consumption for daily requirements (X19)	-100.444	-0.404	77.002	-1.304	
20	Exposure to media(X20)	8.924	0.008	252.810	0.035	
21	Expenditure allocation (X21)	0.075	0.043	0.469	0.159	
	t value>2.048 significant at p=0.05(*)					

The Table 11 presents the Multiple Linear Regression Analysis to estimate that the respective causal contribution of 21 exogenous variables on the dependent variable, market value of organic paddy (Y_3).

Results: It is observed that none of the causal variable is significant. So, in that case the highest t-value i.e., organic manure application(X_{10}) is considered as significant.

MODEL - 10



Revelation: The table shows that none of the causal variable has recorded a significant value in terms of impact on consequent variable. However, the variable organic manure application (X_{10}) has shown a near significant relationship which implies the more organic manure applied, the better have been the market value of organic paddy.

So, the variable organic manure application (X_{10}) can be indicator variables to measure the market value of organic paddy (Y_3). r^2 value being 0.370 it is to conclude that 37 percent of the variability embedded with the consequent variable market value of organic paddy (Y_3) has been explained with the combination of the 21 causal variables.

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Table 6.12: Multiple Regression Analysis: Return of the product from organic paddy (Y_4) vs. 21 causal variables ($X_1 - X_{21}$).

Multiple r sq - 0.492

Sl. No.	Variables	Beta	Reg. coef. B	S, error B	t-value	Remarks
1	Age (X1)	-6.814	-0.071	17.895	-0.381	
2	Education (X2)	-132.066	-0.341	74.535	-1.772	
3	Family size (X3)	-171.588	-0.458	106.475	-1.612	
4	Cropping intensity (X4)	2.136	-0.023	8.989	2.065	*
5	Total holding size(X5)	-105.343	-0.197	113.192	-0.931	
6	Total home stead area (X6)	-156.345	-0.057	654.654	-0.239	
7	Total area under horticultural crops (X7)	128.902	0.187	177.827	0.725	
8	Total area under field crops (X8)	112.650	0.384	67.385	1.672	
9	Irrigation status (X9)	-617.281	-0.056	2037.500	-0.303	
10	Organic manure application (X10)	2.775	0.245	1.446	2.228	*
11	Green leaf manure application (X11)	26.304	0.093	53.122	0.495	
12	Bio-Fertilizer application (X12)	-2090.904	-0.097	4391.184	-0.476	
13	Compost application (X13)	7.073	0.074	24.803	0.285	

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14	Organic pesticides application (X14)	203.674	0.393	106.535	1.912	
15	No of cattles(X15)	308.000	0.468	205.878	1.496	
16	Total amount of cowdung produce(X16)	-29.230	-0.553	18.197	-1.606	
17	Avg. electric bill for Domestic purpose (X17)	-7.042	-0.103	15.362	-0.458	
18	Avg. electric bill for Field purpose (X18)	-3.736	-0.044	17.056	-0.219	
19	Avg. consumption for daily requirements (X19)	-87.342	-0.467	52.016	-1.679	
20	Exposure to media (X20)	-90.724	-0.109	170.776	-0.531	
21	Expenditure allocation X21)	-0.084	-0.065	0.317	-0.265	
	t value>2.048 significant at p=0.05(*)					

The Table 12 presents the Multiple Linear Regression Analysis to estimate that the respective causal contribution of 21 exogenous variables on the dependent variable, return of the product from organic paddy (Y_4).

Results: It has been found that the variables Cropping Intensity (X_4) and Organic manure application (X_{10}) have recorded a significant causal-effect impact on return of the paddy from organic paddy (Y_4).

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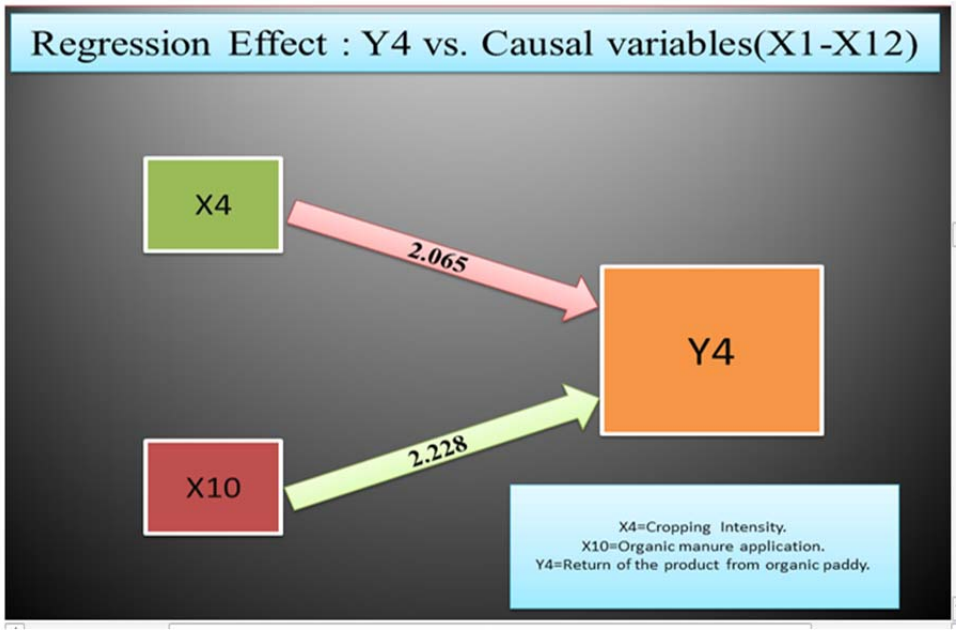
MODEL - 11



Revelation: Higher cropping intensity, more organic manure application, increase the production and quality of organic paddy which derives higher return from it. More organic manure applied to the field increase the yield, which in turns increases the return of organic paddy i.e., cropping intensity and organic manure application is directly proportional to the return of the product from organic paddy

So, the variable cropping intensity (X_4), and organic manure application (X_{10}) can be indicator variables to measure the return of the product from organic paddy (Y_4). r^2 value being 0.492 it is to conclude that 49.2 percent of the variability embedded with the consequent variable return of the product from organic paddy (Y_4) has been explained with the combination of the 21 causal variables.

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Table 6.13: Multiple Regression Analysis: Return of the product from inorganic paddy (Y_5) vs. 21 causal variables (X_1–X_{21}).

Multiple r sq - 0.473

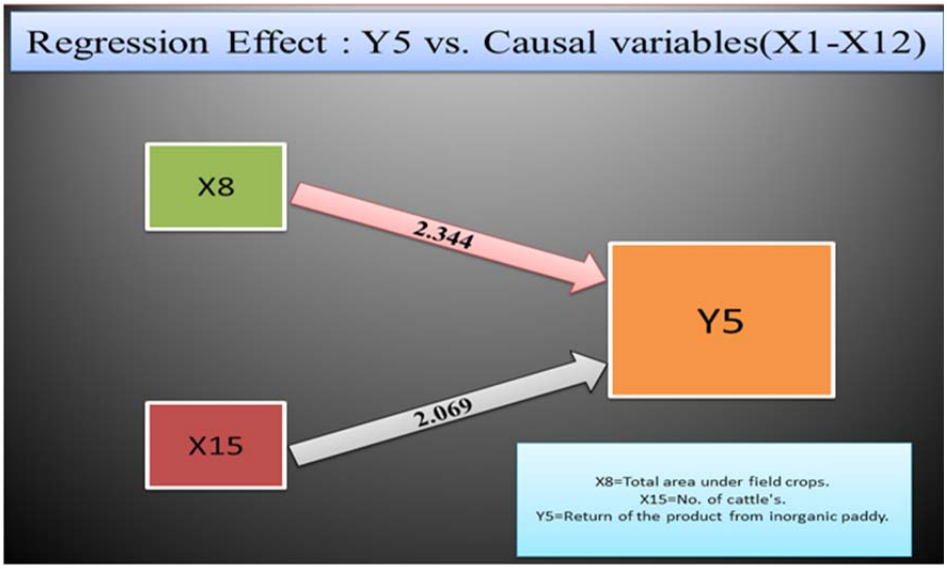
Sl. No.	Variables	Beta	Reg. coef. B	S, error B	t-value	Remarks
1	Age (X1)	-6.802	-0.59	22.132	-0.307	
2	Education (X2)	-107.291	-0.228	92.181	-1.164	
3	Family size (X3)	-296.158	-0.650	131.683	-2.249	
4	Cropping intensity (X4)	3.360	0.056	11.117	0.302	
5	Total holding size (X5)	-132.941	-0.204	139.991	-0.950	
6	Total home stead area (X6)	-190.242	-0.057	809.648	-0.235	
7	Total area under horticultural crops (X7)	-71.334	-0.085	219.929	-0.324	
8	Total area under field crops (X8)	195.313	0.547	83.339	2.344	*
9	Irrigation status (X9)	-1520.128	-0.114	2519.893	-0.603	
10	Organic manure application (X10)	-0.357	-0.041	1.788	-0.200	
11	Green leaf manure application (X11)	9.539	0.028	65.699	0.145	
12	Bio-Fertilizer application (X12)	2798.443	0.107	5430.830	0.515	
13	Compost application (X13)	-21.603	-0.186	30.675	-0.704	

14	Organic pesticides application (X14)	240.813	0.382	131.759	1.828	
15	No of cattles (X15)	516.502	0.646	254.621	2.069	*
16	Total amount of cowdung produce (X16)	-33.433	-0.520	22.505	-1.486	
17	Avg. electric bill for Domestic purpose (X17)	-9.667	-0.117	18.999	-0.509	
18	Avg. electric bill for Field purpose (X18)	0.982	0.010	21.094	0.047	
19	Avg. consumption for daily requirements (X19)	-73.324	-0.323	64.331	-1.140	
20	Exposure to media (X20)	-220.469	-0.217	211.209	-1.044	
21	Expenditure allocation (X21)	0.150	0.095	0.392	0.384	
	t value>2.048 significant at p=0.05(*)					

The Table 13 presents the Multiple Linear Regression Analysis to estimate that the respective causal contribution of 21 exogenous variables on the dependent variable, return of the product from inorganic paddy (Y_5).

Results: It has been found that the variables Total area under field crops (X_8) and No. of cattles (X_{15}) has recorded a significant causal-effect impact on return of the product from inorganic paddy (Y_5).

MODEL - 12



Revelation: The more the area under field crops, the higher will be the return of the product from inorganic paddy (Y_5). So, land as a resource still has got a decisive impact on both the organic and inorganic farming in terms of their economic and biological activities.

Here, also the no. of cattles has contributed a substantial impact on return of the product from inorganic (Y_5). So, a mixed between organic manure and inorganic farming has had a substantial impact on the return.

So these two variables can be indicator variables to measure the return of the product from inorganic paddy (Y_5)..r^2 value being 0.473 it is to conclude that 47.3 percent of the variability embedded with the consequent variable return of the product from inorganic paddy (Y_5), has been explained with the combination of the 21 causal variables.

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Table 6.14: Multiple Regression Analysis: Return of the product from mixed farming both organic and inorganic paddy (Y_6) vs. 21 causal variables ($X_1 – X_{21}$).

Multiple r sq- 0.469

Sl. No.	Variables	Beta	Reg. coef. B	S, error B	t-value	Remarks
1	Age (X1)	-6.808	-0.069	19.007	-0.358	
2	Education (X2)	-119.679	-0.298	79.164	-1.512	
3	Family size(X3)	233.873	-0.600	113.088	2.068	*
4	Cropping intensity (X4)	1.112	0.022	9.547	0.116	
5	Total holding size(X5)	-119.142	-0.214	120.222	-0.991	
6	Total home stead area(X6)	-173.294	-0.061	695.313	-0.249	
7	Total area under horticultural crops(X7)	28.784	0.040	188.871	0.152	
8	Total area under field crops (X8)	153.982	0.504	71.570	2.151	*
9	Irrigation status (X9)	-1068.705	-0.094	2164.044	-0.494	
10	Organic manure application (X10)	0.709	0.094	1.536	0.462	
11	Green leaf manure application (X11)	17.921	0.061	56.421	0.318	
12	Bio-Fertilizer application (X12)	353.769	0.016	4663.911	0.076	
13	Compost application (X13)	-7.265	-0.073	26.343	-0.276	
14	Organic pesticides application (X14)	222.244	0.413	113.152	1.964	
15	No of cattle's (X15)	412.251	0.603	218.664	1.885	

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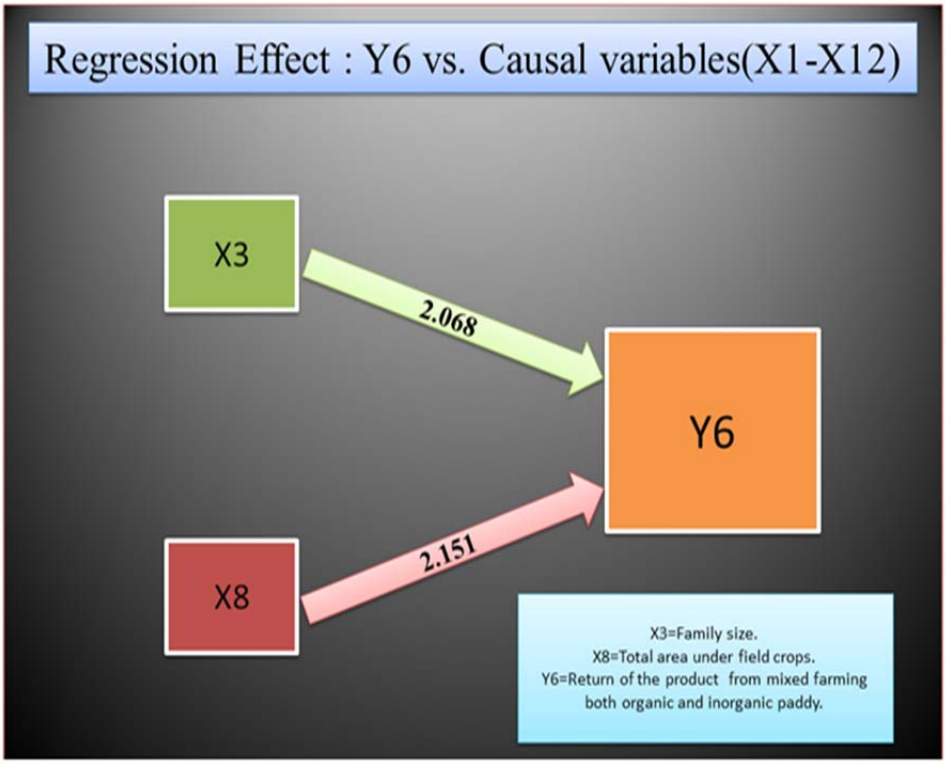
16	Total amount of cowdung produce(X16)	-31.331	-0.570	19.327	-1.621	
17	Avg. electric bill for Domestic purpose (X17)	-8.355	-0.118	16.316	-0.512	
18	Avg. electric bill for Field purpose (X18)	-1.377	-0.016	18.115	-0.076	
19	Avg. consumption for daily requirements (X19)	-80.333	-0.414	55.247	-1.454	
20	Exposure to media(X20)	-155.597	-0.179	181.383	-0.858	
21	Expenditure allocation (X21)	0.033	0.025	0.337	0.099	
	t value>2.048 significant at p=0.05(*)					

The Table 14 presents the Multiple Linear Regression Analysis to estimate that the respective causal contribution of 21 exogenous variables on the dependent variable, return of the product from mixed farming both organic and inorganic paddy (Y_6).

Results: It has been found that the variables Family size (X_3) and Total area under field crops (X_8) has recorded a significant causal-effect impact on return of the product from mixed farming both organic and inorganic paddy (Y_6).

MODEL - 13



Revelation: Family size shows that the smaller the family size, the higher has been the return. So, no. of family members have got an inverse relationship with the return of the product from mixed farming both organic and inorganic paddy (Y_6).

It is also well discernible that the total area under field crops has positively impact on return of the product from mixed farming both organic and inorganic paddy (Y_6).

So these two variables can be indicator variables to measure the return of the product from mixed farming both organic and inorganic paddy (Y_6)..r^2 value being 0.469 it is to conclude that 46.9 percent of the variability embedded with the consequent variable return of the product from mixed farming both organic and inorganic paddy (Y_6), has been explained with the combination of the 21 causal variables.

Table 6.15: Multiple Regression Analysis: Livelihood from organic paddy (Y_7) vs. 21 causal variables ($X_1 – X_{21}$).

Multiple r sq - 0.253

Sl. No.	Variables	Beta	Reg. coef. B	S, error B	t-value	Remarks
1	Age (X1)	1.329	0.066	4.594	0.289	
2	Education (X2)	-12.521	-0.153	19.132	-0.654	
3	Family size (X3)	5.796	0.073	27.331	0.212	
4	Cropping intensity (X4)	2.888	0.085	2.307	2.385	*
5	Total holding size (X5)	25.399	0.224	29.055	0.874	
6	Total home stead area (X6)	-187.851	-0.323	168.045	-1.118	
7	Total area under horticultural crops (X7)	21.133	0.144	45.647	0.463	
8	Total area under field crops (X8)	-0.585	-0.009	17.297	-0.034	
9	Irrigation status (X9)	171.587	0.074	523.011	0.329	
10	Organic manure application (X10)	0.023	0.015	0.371	0.061	
11	Green leaf manure application (X11)	19.939	0.315	13.636	2.389	*
12	Bio-Fertilizer application (X12)	100.500	0.022	1127.183	0.089	

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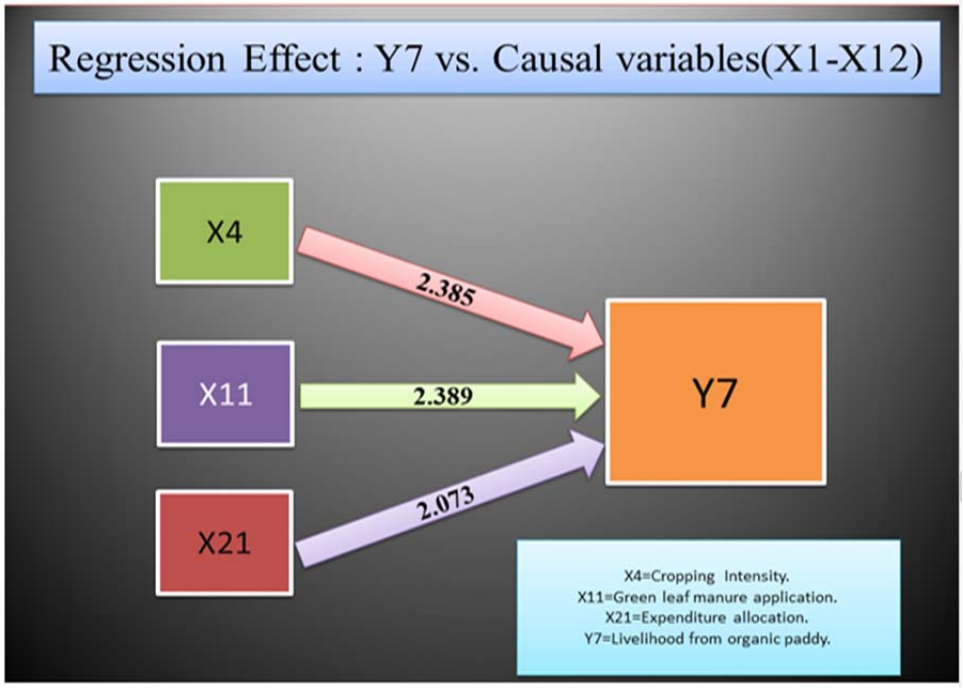
13	Compost application (X13)	5.174	0.255	6.367	0.813	
14	Organic pesticides application (X14)	27.964	0.255	27.347	1.023	
15	No of cattles (X15)	-2.406	-0.017	52.847	-0.046	
16	Total amount of cowdung produce (X16)	-1.076	-0.096	4.671	-0.230	
17	Avg. electric bill for Domestic purpose (X17)	-0.771	-0.053	3.943	-0.195	
18	Avg. electric bill for Field purpose (X18)	5.485	0.306	4.378	1.253	
19	Avg. consumption for daily requirements (X19)	5.748	0.145	13.352	0.430	
20	Exposure to media(X20)	12.475	0.071	43.837	0.285	
21	Expenditure allocation (X21)	2.087	-0.318	0.081	2.073	*
	t value>2.048 significant at p=0.05(*)					

The Table 15 presents the Multiple Linear Regression Analysis to estimate that the respective causal contribution of 21 exogenous variables on the dependent variable, Livelihood from organic paddy (Y_7).

Results: It has been found that the variables Cropping intensity (X_4), Green leaf manure application (X_{11}) and Expenditure allocation (X_{21}) has recorded a significant causal-effect impact on Livelihood from organic farming (Y_7).

MODEL - 14



Revelation: The table depicts that more green leaf manure application; cropping intensity and expenditure allocation have higher contribution on livelihood from organic farming. Due to more green leaf manure application, the production from organic farming is remarkably increasing which provides the better livelihood. Higher cropping intensity provides farmer the multiple source of livelihood, which ultimately increases the standard of living of the farmer. Modernization of agriculture is only

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possible with higher expenditure allocation in farming and that modernization in agriculture allows farmers to enjoy a better livelihood.

So these three variables can be indicator variables to measure the Livelihood from organic farming (Y_7)..r^2 value being 0.253 it is to conclude that 25.3 percent of the variability embedded with the consequent variable Livelihood from organic farming (Y_7), has been explained with the combination of the 21 causal variables.

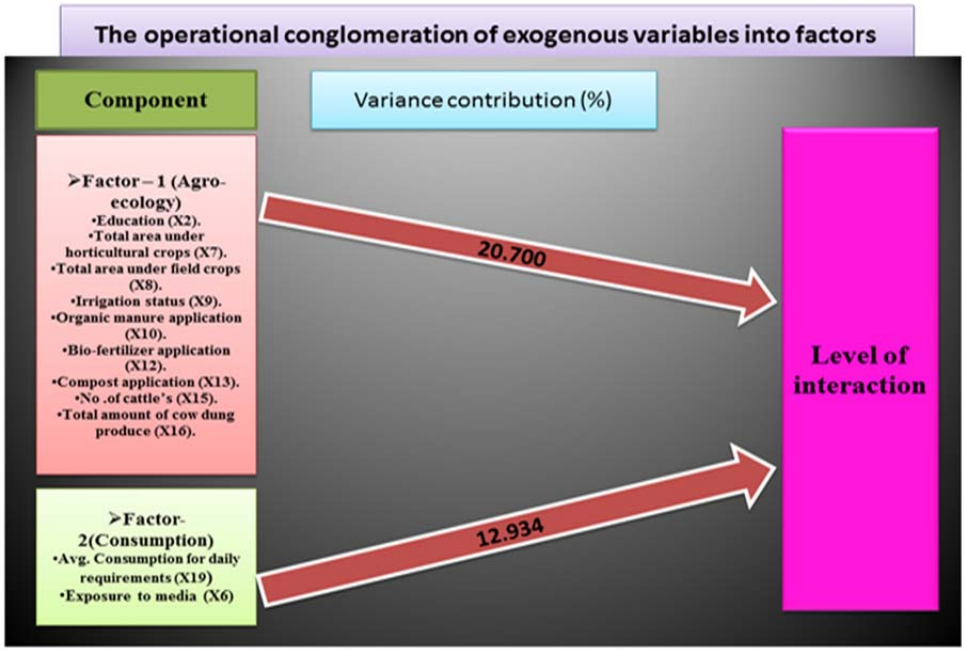
Table 6.16: Factor Analysis- Conglomeration of 21 variables in 8 factors.

Factors	Variables	Factor Loading	% of Variance	Cumulative %	Factors Renamed
Factor 1	Education**(X2)**	0.608	20.700	20.700	Agro-ecology
	Total area under horticultural crops **(X7)**	0.483			
	Total area under field crops **(X8)**	0.649			
	Irrigation status **(X9)**	0.604			
	Organic manure application **(X10)**	0.582			
	Bio-fertilizer application **(X12)**	0.641			
	Compost application **(X13**)	0.740			
	No. of cattles **(X15)**	0.631			
	Total amount of cowdung produce **(X16)**	0.733			

Factor 2	Avg. consumption for daily requirements **(X19)** Exposure to media**(X6)**	0.824 0.713	12.934	33.634	Consumption
Factor 3	Cropping Intensity **(X4)** Green leaf manure application **(X11)**	0.451 0.538	9.778	43.412	Resource
Factor 4	Total holding size **(X5)** Total home stead area **(X6)** Avg. electric bill for domestic purpose **(X17)** Avg. electric bill for field purpose **(X18)**	0.578 0.417 0.479 0.397	8.143	51.555	Energy Consumption
Factor 5	Age**(X1)**	0.406	7.179	58.734	
Factor 6	Family size **(X3)** Organic pesticides application **(X14)**	0.274 0.516	6.647	65.381	Family Capacity
Factor 7	Expenditure allocation **(X21)**	0.587	5.088	76.249	

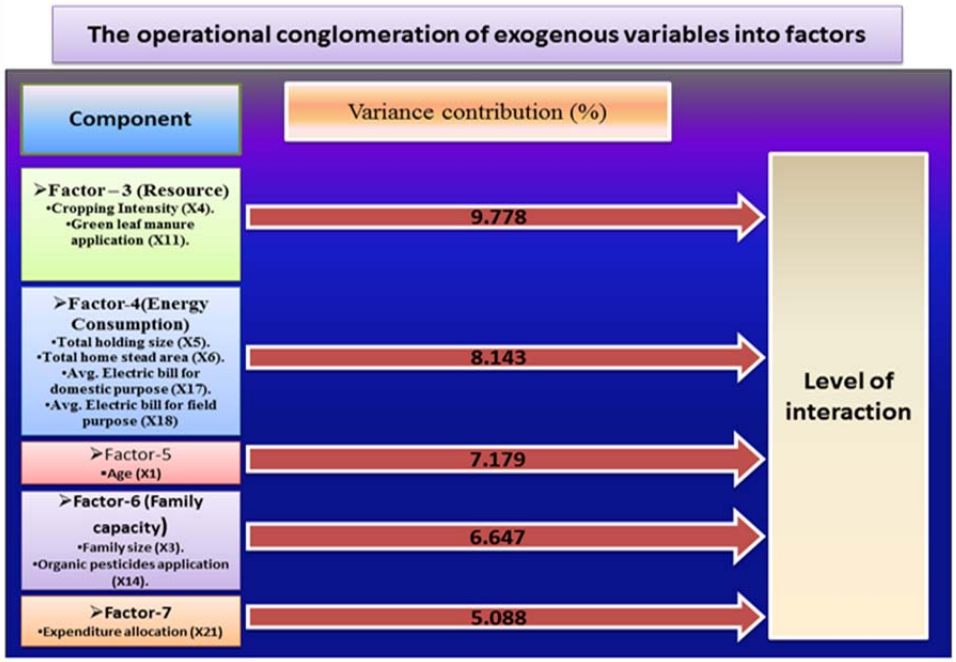
The table shows the factor analysis where in different factors have been formed out of the conglomeration of 21 homogenous variables.

MODEL - 15



Revelation : The factor 1 has included following 9 no of variables i.e., Education (X_2), Total area under horticultural crops (X_7), Total area under field crops (X_8), Irrigation status (X_9), Organic manure application (X_{10}), Bio-fertilizer application (X_{12}), Compost application (X_{13}), No. of cattle (X_{15}), Total amount of cow dung produce (X_{16}) which have contributed 20.700% of variance and has been renamed as **Agro-ecology**. The factor 2 has included 2 no of variables i.e. Exposure to media (X_6), Avg. consumption for daily requirements (X_{19}) that have contributed 12.934% of variance have been renamed as **Consumption**.

MODEL - 16



Revelation : The factor 3 has included 2 no of variables i.e. Cropping Intensity (X_4), Green leaf manure application (X_{11}) which have contributed 9.778% of variance and has been renamed as **Resource**. The factor 4 has included 4 variables under it i.e. Total holding size (X_5), Total home stead area (X_6), Avg. electric bill for domestic purpose (X_{17}), Avg. electric bill for field crops (X_{18}) which have contributed 8.143% of variance and has been renamed as **Energy Consumption**. The factor 6 has included 2 no of variables i.e. Family Size(X_3) and Organic pesticides application (X_{14}) that have contributed 6.647% of variance has been renamed as **Family capacity**.

COMPARISON BETWEEN ORGANIC AND INORGANIC FARMING AS EVIDENCED IN THE STUDY

The productive behaviour of organic and inorganic farming has got both similarities and unique characters. While organic farming is followed in Aman Rice, which is mainly a rainfed crop in North Bengal. The inorganic farming is followed both in Boro and Aman Rice.

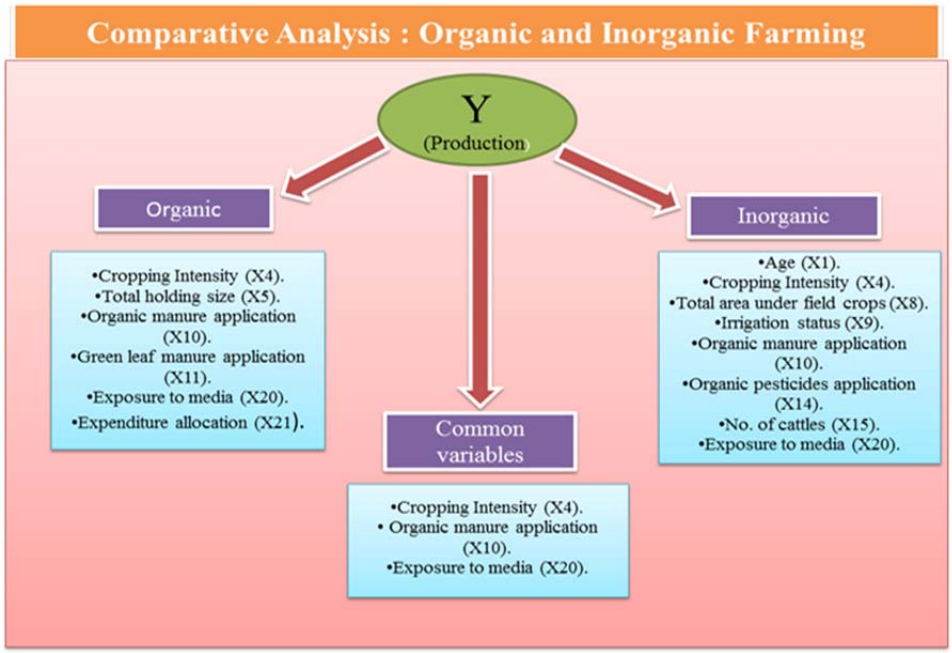
By dint of the nature of enterprise, inorganic rice production has been cost intensive, input intensive and labour intensive as well. Organic farming, it is low chemical input and low energy intensive farming.

The variables which have recorded significant correlation uniquely in organic paddy have been cropping intensity (X_4), total holding size (X_5), green leaf manure (X_{11}). So, holding size and green leaf manure are the two important considerations for the respondents of organic paddy growers vis-a-vis organic farming.

Similarly, for inorganic farming, total area under field crops (X_8), irrigation status (X_9) and organic manure application (X_{10}) have come up with unique correlation with the productivity of inorganic paddy. So, for the respondents growing inorganic paddy, there are the important considerations especially the irrigation status (X_9).So, irrigation can be considered a critical intervention that has made a perceptible differences between organic and inorganic paddy enterprise.

For both, the enterprise i.e., organic paddy and inorganic paddy, cropping intensity (X_4), exposure to media (X_{20}) have come up as common character. So, this two variables can explore a missing link between organic and inorganic paddy or, here in the study organic and inorganic farming.

MODEL - 17



PARTICIPATORY DELINEATION

- **Venn Diagram**

A Venn diagram is a diagram that shows all possible logical relations between a finite collections of sets.

What does Venn diagram represents in agro ecosystem analysis?

- Key institutions and individuals in and around the ecosystem.
- Their relationship and importance as perceived by the villagers.

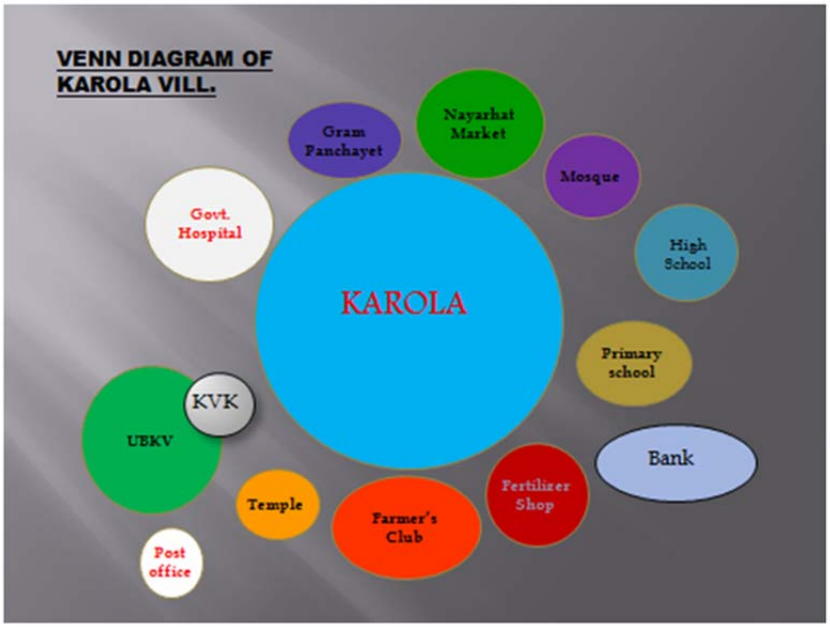
Basis of making Venn diagram

- Size of discs.
- Distance of the discs from the large circle.

Steps to be followed for preparing Venn diagram

- Sit with the villagers.
- Identify the important institutions.
- Cut paper circles of different sizes.
- The largest circle is considered as village.
- Ask the villagers to choose the different size's discs for the identified institutions according to the importance of the institutions.
- Arrange all the discs around the large circle as per following rule:
  - Distant circle: minimum contact between village and the institution.
  - Touching circle: information sharing only.
  - Overlapping: co-operation in decision.

MODEL – 18



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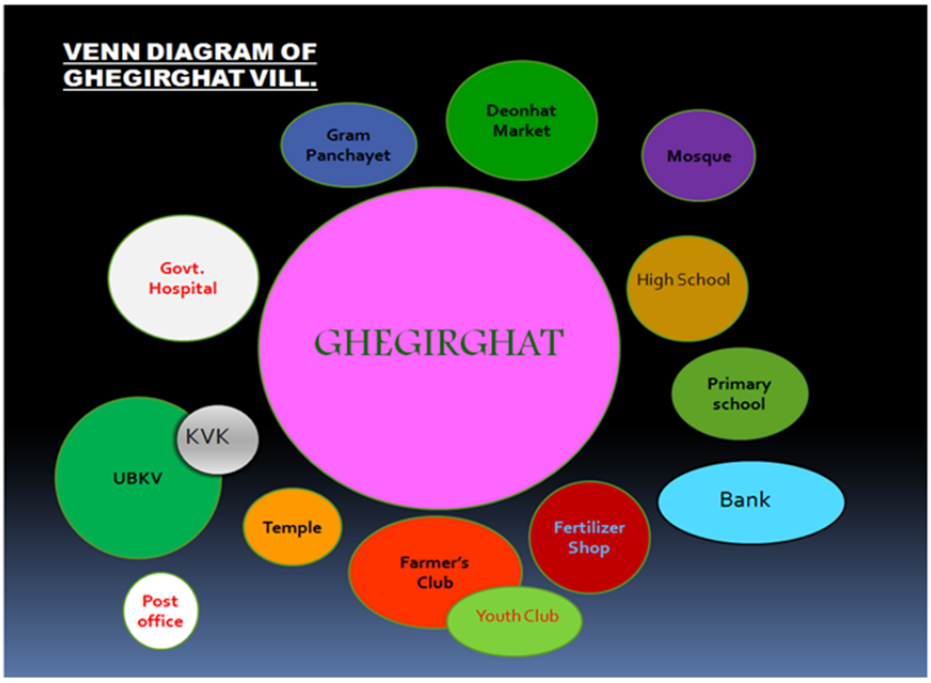
MODEL - 19



- **Matrix Ranking**

Matrix ranking is an important tool to enumerate the farmers' preference and the decision of the innovation-decision process. According to the preferences of the farmers a matrix has been formed to delineate the rank of the particular variety or crops on the basis of their qualitative features. During the data collection, I have conducted a study to know the farmers' preference regarding the rice variety in the village Karola. The study is conducted on the basis of the qualitative aspects like the qualitative impact of rice crop on the basis of its the production, cooking quality, scented, disease-pest free, climatic resistant, profit according to the preferences of the farmers.

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OBJECTIVES:

- To know the most suitable variety for a particular area.
- To rank the varieties according to their performance.
- To judge the market value of the variety.

6.17: Table: Matrix Ranking: Choices and Ranking of Rice varieties in Karola village.

Attributes / Varieties	**Production**	**Cooking quality**	**Scented**	**Disease-pest free**	**Climatic resistant**	**Profit**	**Total**	**Rank**
Swarna Masuri	9	9	8	5	5	9	**45**	**1st**
Tulai Panji	8	8	6	5	6	9	**42**	**2nd**
Jeera moti	7	7	6	6	5	7	**38**	**4th**
Kalabhog	8	6	7	6	5	8	**40**	**3rd**
Avishek	6	4	5	7	6	6	**34**	**6th**
Arise	5	5	4	6	6	6	**32**	**7th**
28	6	5	5	6	7	6	**35**	**5th**
Total	**49**	**44**	**41**	**41**	**40**	**51**		

RESULT AND DISCUSSION

From the matrix ranking on rice variety it is observed that the marks obtained by **Swarna Masuri** is the **highest** which provides greatest suitability to farming community to raise their income whereas the marks obtained by the variety **Arise** is the **lowest**.

CONCLUSION

Hence, the variety **Swarna Masuri** is the most popular and the variety Arise is the least popular variety in Karola village.

6.18: Table: Matrix Ranking: Choices and Ranking of Rice varieties in Ghegirghat village.

Attributes / Varieties	Production	Cooking quality	Scented	Disease-pest free	Climatic resistant	Profit	Total	Rank
Tulai Panji	7	7	6	6	6	7	**39**	**4th**
Sub-1	9	9	8	5	5	9	**45**	**1st**
Kalabhog	7	5	8	7	6	7	**40**	**3rd**
Swarna	8	7	7	5	5	9	**41**	**2nd**
28	7	5	5	6	6	7	**36**	**5th**
Total	**38**	**33**	**34**	**29**	**28**	**39**		

RESULT AND DISCUSSION

From the matrix ranking on rice variety it is observed that the marks obtained by **Sub-1** is the **highest** which provides greatest suitability to farming community to raise their income whereas the marks obtained by the variety **28** is the **lowest**.

CONCLUSION

Hence, the variety **Sub-1** is the most popular and the variety Arise is the least popular variety in Ghegirghat village.

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