Chapter–8

Results and Discussion

S K Acharya, Anshuman Jena, G C Mishra and Lalu Das

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 done to reveal the cause behind it.

Table 24: Descriptive statistics of independent variables with respected to Mean, Standard Deviation values.

Sl. No.	Variables	Mean	SD	CV
1.	Age **(X_1)**	53.24	9.92	18.63
2.	Education **(X_2)**	4.94	4.15	84.01
3.	Family Size **(X_3)**	5.07	2.13	42.01
4.	Family Education Status **(X_4)**	6.09	2.30	37.77
5.	No. of Vehicles changed **(X_5)**	1.94	0.86	44.33
6.	Change in Consumption of Kerosene **(X_6)**	-2.30	1.23	-53.48
7.	Change in Consumption of Petrol **(X_7)**	8.59	10.45	121.65
8.	Changing Family Expenditure **(X_8)**	637.76	462.94	72.59
9.	Changing Expenditure Allocation on Farming **(X_9)**	3.38	10.90	322.49

ISBN: 978-93-85822-01-8

10.	Changing Expenditure Allocation on Education **(X_{10})**	12.61	8.34	66.14
11.	Changing Expenditure Allocation on Health **(X_{11})**	7.05	5.66	80.28
12.	Change in Listening to Radio **(X_{12})**	-26.44	34.47	-130.37
13.	Change in Watching T.V **(X_{13})**	39.92	23.74	59.47
14.	Changing Interaction with Input Dealers **(X_{14})**	2.44	2.11	86.48
15.	Changing Interaction with Extension Agent **(X_{15})**	3.54	2.62	74.01
16.	Change in Farm Size **(X_{16})**	-0.14	0.30	-214.29
17.	Changing Cropping Intensity **(X_{17})**	51.71	27.40	52.99
18.	Changing Cultivable Land **(X_{18})**	0.10	0.69	690.00
19.	Change in Fertilizer Application **(X_{19})**	52.03	24.34	46.78

8.1 Coefficient of Correlation

Table No. 25: Coefficient of Correlation(r): Change in Perceived Effect of Radio (Y_1) vs 19 independent variables

Sl. No.	Variables	R value	Remarks
1.	Age **(X_1)**	0.0732	
2.	Education **(X_2)**	-0.1978	
3.	Family Size **(X_3)**	-0.1182	
4.	Family Education Status **(X_4)**	-0.3099	**
5.	No. of Vehicles changed **(X_5)**	-0.2280	*
6.	Change in Consumption of Kerosene **(X_6)**	0.3047	**
7.	Change in Consumption of Petrol **(X_7)**	-0.3584	**
8.	Changing Family Expenditure **(X_8)**	-0.2227	*
9.	Changing Expenditure Allocation on Farming **(X_9)**	-0.0797	

ISBN: 978-93-85822-01-8

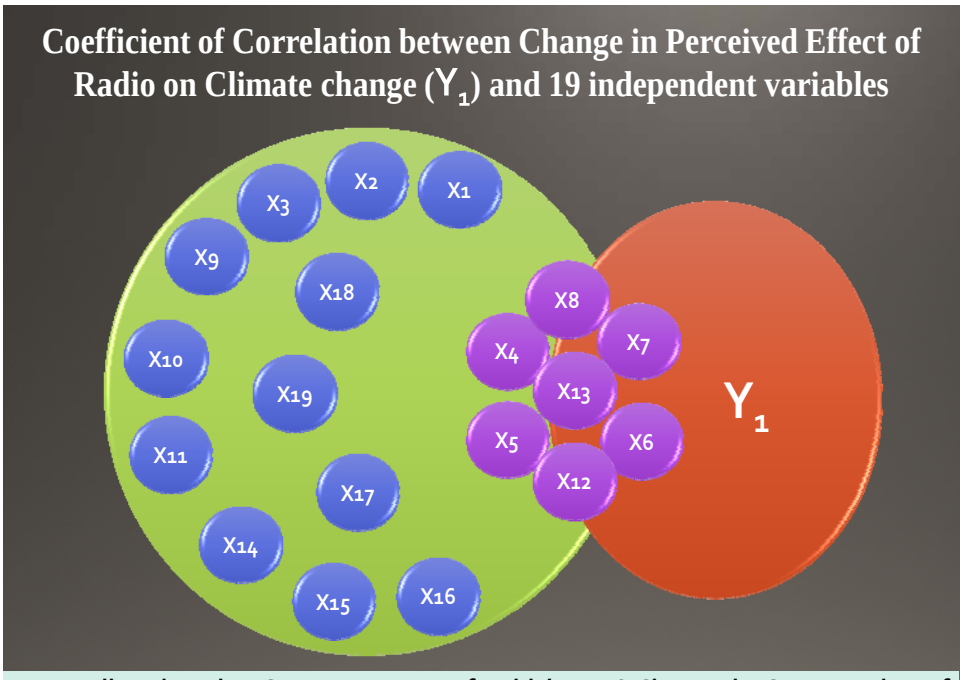
10.	Changing Expenditure Allocation on Education **(X_{10})**	-0.0673	
11.	Changing Expenditure Allocation on Health **(X_{11})**	0.0195	
12.	Change in Listening to Radio **(X_{12})**	0.7292	**
13.	Change in Watching T.V **(X_{13})**	-0.5035	**
14.	Changing Interaction with Input Dealers **(X_{14})**	-0.0480	
15.	Changing Interaction with Extension Agent **(X_{15})**	-0.0835	
16.	Change in Farm Size **(X_{16})**	-0.0761	
17.	Changing Cropping Intensity **(X_{17})**	0.0069	
18.	Changing Cultivable Land **(X_{18})**	-0.1371	
19.	Change in Fertilizer Application **(X_{19})**	-0.0164	
	r>0.220 significant at p=0.05(*) r>0.287 significant at p=0.01(**)		

Table 2 presents the coefficient of correlation between Change in Perceived Effect of Radio on Climate change (Y_1) and 19 independent variables.

Results: It is found that the variables, Family Education Status (X_4), No. of Vehicles (X_5), Change in Consumption of Petrol (X_7), Changing Family Expenditure (X_8), Change in Watching T.V (X_{13}), have found negative but significant correlation whereas variables like, Change in Consumption of Kerosene (X_6), Change in Listening to Radio (X_{12}), have positive significant correlation with the dependent variable i.e. Change in Perceived Effect of Radio on Climate change (Y_1).

ISBN: 978-93-85822-01-8

Model-1



X_4-Family Education Status , X_5-No. of Vehicles, X6-Change in Consumption of Kerosene, X_7-Change in Consumption of Petrol, X_8-Changing Family Expenditure, X_{12}-Change in Listening to Radio, X_{13}-Change in Watching T.V .
Y_1- Change in Perceived Effect of Radio

Revelation: The result has implied that the change in perceived effect of radio is dominant on the respondents, who are lagging in family education status, consuming fuel, allotting higher family expenditure & watching T.V. But consumption of kerosene and more listening to radio have positively impacted on it.

That means, Radio as a mass media, has been able to increase its impact on change perception or climate phenomenon, especially for the traditional, coastal dwelling people.

ISBN: 978-93-85822-01-8

Table No. 26: Coefficient of Correlation(r): Change in Perceived Effect of T.V (Y_2) vs 19 independent variables

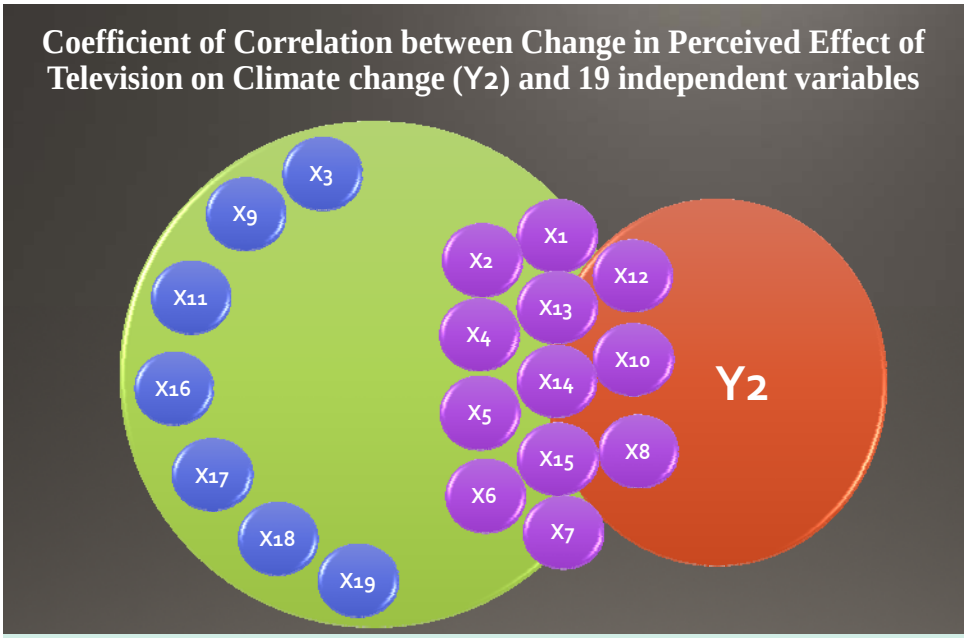
Sl. No.	Variables	R value	Remarks
20.	Age **(X_1)**	-0.3076	**
21.	Education **(X_2)**	0.3033	**
22.	Family Size **(X_3)**	0.0082	
23.	Family Education Status **(X_4)**	0.3023	**
24.	No. of Vehicles changed **(X_5)**	0.2818	*
25.	Change in Consumption of Kerosene **(X_6)**	-0.4136	**
26.	Change in Consumption of Petrol **(X_7)**	0.3356	**
27.	Changing Family Expenditure **(X_8)**	0.2386	*
28.	Changing Expenditure Allocation on Farming **(X_9)**	0.0106	
29.	Changing Expenditure Allocation on Education **(X_{10})**	0.2257	*
30.	Changing Expenditure Allocation on Health **(X_{11})**	0.1043	
31.	Change in Listening to Radio **(X_{12})**	-0.4686	**
32.	Change in Watching T.V **(X_{13})**	0.7681	**
33.	Changing Interaction with Input Dealers **(X_{14})**	0.2572	*
34.	Changing Interaction with Extension Agent **(X_{15})**	0.3481	**
35.	Change in Farm Size **(X_{16})**	0.0758	
36.	Changing Cropping Intensity **(X_{17})**	0.0039	
37.	Changing Cultivable Land **(X_{18})**	0.0976	
38.	Change in Fertilizer Application **(X_{19})**	0.0655	
	r>0.220 significant at p=0.05(*) r>0.287 significant at p=0.01(**)		

Table 3, presents the coefficient of correlation between Change in Perceived Effect of T.V (Y_2) and 19 independent variables.

ISBN: 978-93-85822-01-8

Results: It is found that variables like, Education (X_2), Family Education Status (X_4), No. of Vehicles changed (X_5), Change in Consumption of Petrol (X_7), Changing Family Expenditure (X_8), Changing Expenditure Allocation on Education (X_{10}), Change in Watching T.V (X_{13}), Changing Interaction with Input Dealers (X_{14}), Changing Interaction with Extension Agent (X_{15}), have exerted positive significant correlation, whereas variables, Age (X_1) & Change in Consumption of Kerosene (X_6), have exerted significant but negative correlation with the dependent variable i.e. Change in Perceived Effect of T.V (Y_2).

Model-2



X1-Age, X2-Education, X4-Family Education Status, X5-No. of Vehicles, X6-Change in Consumption of Kerosene, X7-Change in Consumption of Petrol, X8-Changing Family Expenditure, X10-Changing Expenditure Allocation on Education, X12-Change in Listening to Radio, X13-Change in Watching T.V, X14-Changing Interaction with Input Dealers, X15-Changing Interaction with Extension Agent .
Y2- Change in Perceived Effect of Television

ISBN: 978-93-85822-01-8

Revelation: Young age respondents are highly impacted by the Television in relation to change pattern. Those are consuming less kerosene or bit ahead in the process modernization, they are watching more time Television to build ecological concept. The other variables like education, more consumption of petrol, more family expenditure, more interaction with extension agent, etc. by becoming urbanite in nature, have also been able to imply that ecological changes are predominant through learning experience through Television watching. Change in Perceived Effect of T.V is more in young, educated, cosmopolite people.

Table No. 27: Coefficient of Correlation(r): Change in Perceived Effect of Input dealer (Y_3) vs 19 independent variables

Sl. No.	Variables	R value	Remarks
1.	Age **(X_1)**	0.0580	
2.	Education **(X_2)**	-0.1161	
3.	Family Size **(X_3)**	0.2609	*
4.	Family Education Status **(X_4)**	-0.1418	
5.	No. of Vehicles changed **(X_5)**	0.0591	
6.	Change in Consumption of Kerosene **(X_6)**	-0.1450	
7.	Change in Consumption of Petrol **(X_7)**	-0.0315	
8.	Changing Family Expenditure **(X_8)**	-0.2231	*
9.	Changing Expenditure Allocation on Farming **(X_9)**	-0.0292	
10.	Changing Expenditure Allocation on Education **(X_{10})**	-0.0524	
11.	Changing Expenditure Allocation on Health **(X_{11})**	0.2683	*
12.	Change in Listening to Radio **(X_{12})**	-0.0951	
13.	Change in Watching T.V **(X_{13})**	-0.0391	
14.	Changing Interaction with Input Dealers **(X_{14})**	0.6009	**
15.	Changing Interaction with Extension Agent **(X_{15})**	0.1112	

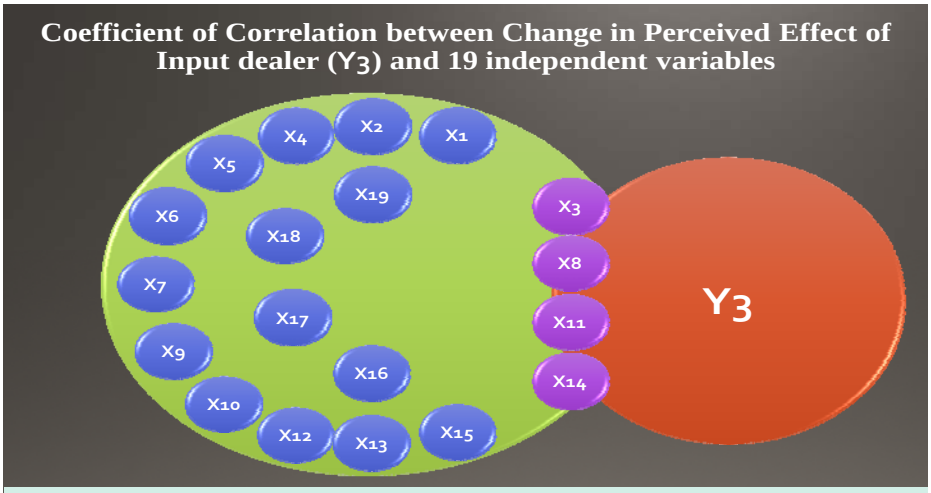
ISBN: 978-93-85822-01-8

16.	Change in Farm Size **(X_{16})**	-0.2061	
17.	Changing Cropping Intensity **(X_{17})**	0.0619	
18.	Changing Cultivable Land **(X_{18})**	-0.1879	
19.	Change in Fertilizer Application **(X_{19})**	0.0692	
	r>0.220 significant at p=0.05(*) r>0.287 significant at p=0.01(**)		

Table 4 presents the coefficient of correlation between Change in Perceived Effect of Input dealer (Y_3) and 19 independent variables.

Results: It has been found that the variables, Family Size (X_3), Changing Expenditure Allocation on Health (X_{11}), Changing Interaction with Input Dealers (X_{14}), have recorded a positive significant correlation whereas variable Changing Family Expenditure (X_8), have recorded a negative significant correlation with dependent variable Change in Perceived Effect of Input dealer (Y_3).

Model-3



ISBN: 978-93-85822-01-8

Revelation: Bigger family size needs more food or production to fulfill their requirements which make the rural people highly impacted by input dealer at grass root level through more interaction with input dealers in relation to perceiving change pattern.

The perception on change pattern, as recorded by the input dealers, has been built up and characterized by some management and motivational behavior. The change in family indicator, is a good indicator to estimate the change dynamics perception.

Table No. 28: Coefficient of Correlation(r): Change in Perceived Effect of Extension agent (Y_4) vs 19 independent variables

Sl. No.	Variables	R value	Remarks
1.	Age **(X_1)**	0.0042	
2.	Education **(X_2)**	0.0263	
3.	Family Size **(X_3)**	0.1079	
4.	Family Education Status **(X_4)**	0.0284	
5.	No. of Vehicles changed **(X_5)**	0.1265	
6.	Change in Consumption of Kerosene **(X_6)**	-0.1505	
7.	Change in Consumption of Petrol **(X_7)**	0.0318	
8.	Changing Family Expenditure **(X_8)**	-0.0367	
9.	Changing Expenditure Allocation on Farming **(X_9)**	0.0343	
10.	Changing Expenditure Allocation on Education **(X_{10})**	-0.0154	
11.	Changing Expenditure Allocation on Health **(X_{11})**	-0.0186	
12.	Change in Listening to Radio **(X_{12})**	0.0122	
13.	Change in Watching T.V **(X_{13})**	0.3183	**
14.	Changing Interaction with Input Dealers **(X_{14})**	0.1735	
15.	Changing Interaction with Extension Agent **(X_{15})**	0.5060	**

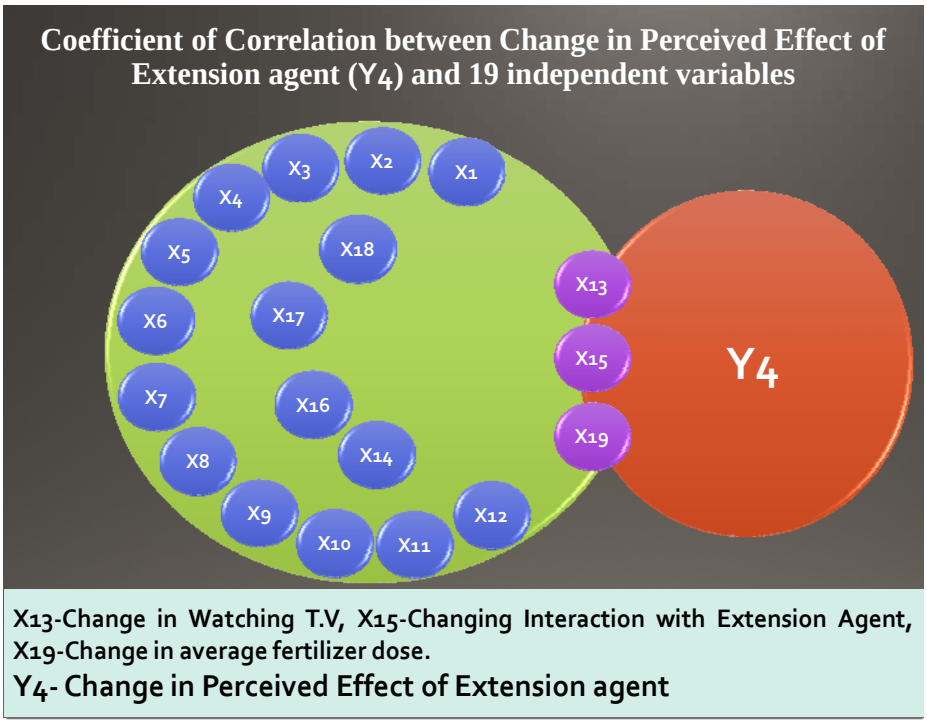
ISBN: 978-93-85822-01-8

16.	Change in Farm Size **(X_{16})**	-0.0142	
17.	Changing Cropping Intensity **(X_{17})**	0.0160	
18.	Changing Cultivable Land **(X_{18})**	0.0664	
19.	Change in Fertilizer Application **(X_{19})**	0.4944	**
	r>0.220 significant at p=0.05(*) r>0.287 significant at p=0.01(**)		

Table 5 presents the coefficient of correlation between Change in Perceived Effect of Extension agent (Y_4) and 19 independent variables.

Results: Variables, Change in Watching T.V (X_{13}), Changing Interaction with Extension Agent (X_{15}), and Change in average fertilizer dose (X_{19}), have been found to have strong positive correlation with dependent variable, Change in Perceived Effect of Extension agent (Y_4).

Model-4



ISBN: 978-93-85822-01-8

Revelation: People with cosmopolite nature are highly impacted by extension agent in relation to perceiving change pattern. To fulfill the demand by increasing the production, new technologies are to be informed regularly. Day by day more watching Television and interacting with extension agent, have made people more cosmopolite. Higher cosmopolite nature leads to gradual increase in perceived effect of extension agent in relation to changing time. Higher fertilizer application refers to more input investment which need more consultation with the resource person i.e. extension agent that will minimize their risk. So, progressive farmers are highly impacted by the extension agent through acquiring required learning experiences. Interaction with extension agent and change in fertilizer application, have made a socio-operational diode to estimate change dynamics as recorded by extension agent.

Table No. 29: Coefficient of Correlation(r): Change in Productivity (Y_5) vs 19 independent variables

Sl. No.	Variables	R value	Remarks
1.	Age **(X_1)**	0.2587	*
2.	Education **(X_2)**	0.0212	
3.	Family Size **(X_3)**	0.2961	**
4.	Family Education Status **(X_4)**	-0.0043	
5.	No. of Vehicles changed **(X_5)**	-0.1475	
6.	Change in Consumption of Kerosene **(X_6)**	-0.2268	*
7.	Change in Consumption of Petrol **(X_7)**	-0.0046	
8.	Changing Family Expenditure **(X_8)**	-0.1563	
9.	Changing Expenditure Allocation on Farming **(X_9)**	0.0484	
10.	Changing Expenditure Allocation on Education **(X_{10})**	-0.2165	

ISBN: 978-93-85822-01-8

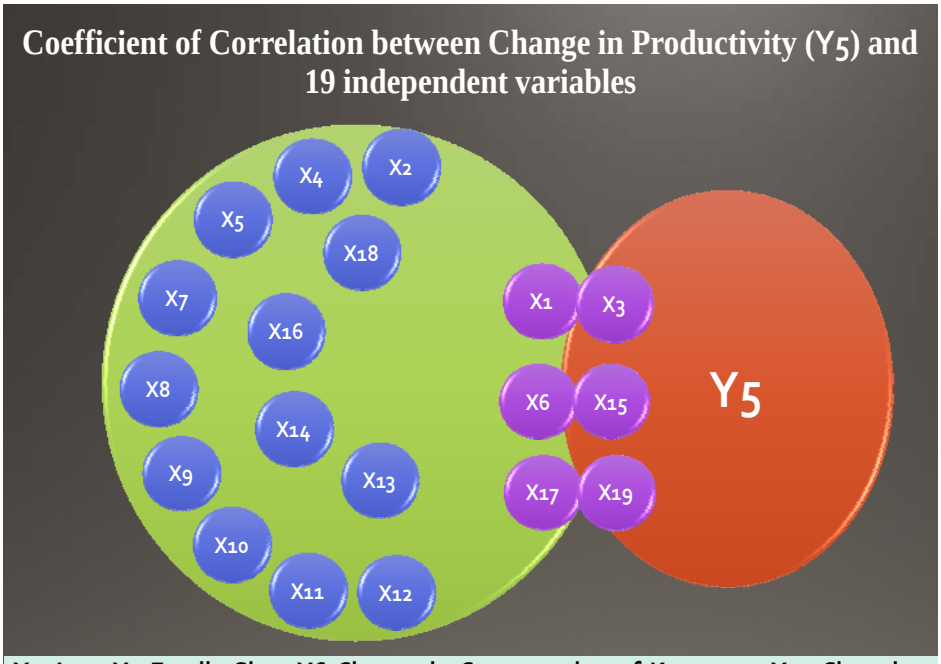
11.	Changing Expenditure Allocation on Health **(X_{11})**	-0.0737	
12.	Change in Listening to Radio **(X_{12})**	0.1079	
13.	Change in Watching T.V **(X_{13})**	-0.0015	
14.	Changing Interaction with Input Dealers **(X_{14})**	0.2104	
15.	Changing Interaction with Extension Agent **(X_{15})**	0.2475	*
16.	Change in Farm Size **(X_{16})**	-0.2110	
17.	Changing Cropping Intensity **(X_{17})**	0.2975	**
18.	Changing Cultivable Land **(X_{18})**	-0.1339	
19.	Change in Fertilizer Application **(X_{19})**	0.7959	**
	r>0.220 significant at p=0.05(*) r>0.287 significant at p=0.01(**)		

Table 6 presents the coefficient of correlation between Change in Productivity (Y_5) and 19 independent variables.

Results: It is found that variables like, Age (X_1), Family Size (X_3), Changing Interaction with Extension Agent (X_{15}), Changing Cropping Intensity (X_{17}), Change in average fertilizer dose (X_{19}), have recorded positive significant correlation where variable, Change in Consumption of Kerosene (X_6), have recorded a negative significant correlation with the dependent variable, Change in Productivity (Y_5).

ISBN: 978-93-85822-01-8

Model-5



X1-Age, X3-Family Size, X6-Change in Consumption of Kerosene, X15-Changing Interaction with Extension Agent, X17-Changing Cropping Intensity, X19-Change in average fertilizer dose.

Y5- Change in Productivity

Revelation: Young farmers prefer modern technologies instead of traditional, to get higher production per unit area. Acquiring knowledge on better farming in compliance with change dynamics through interacting with extension agent increases the productivity level. Also higher cropping intensity and balanced fertilizer application, help to attain higher productivity. Higher cropping intensity leads to increase better soil productivity. But those who are consuming more kerosene that means they are traditional, lagging modern technology, are suffering from low productivity.

ISBN: 978-93-85822-01-8

Table No. 30: Coefficient of Correlation(r): Change in Family income (Y_6) vs 19 independent variables

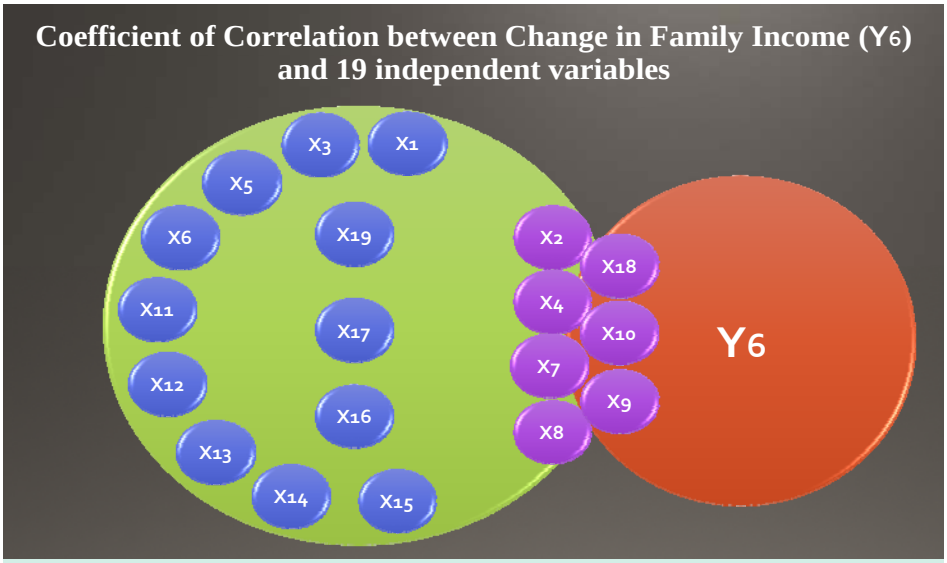
Sl. No.	Variables	R value	Remarks
1	Age **(X_1)**	-0.1347	
2	Education **(X_2)**	0.5083	**
3	Family Size **(X_3)**	-0.1377	
4	Family Education Status **(X_4)**	0.5425	**
5	No. of Vehicles changed **(X_5)**	-0.0731	
6	Change in Consumption of Kerosene **(X_6)**	0.0851	
7	Change in Consumption of Petrol **(X_7)**	0.3569	**
8	Changing Family Expenditure **(X_8)**	0.8718	**
9	Changing Expenditure Allocation on Farming **(X_9)**	-0.2351	*
10	Changing Expenditure Allocation on Education **(X_{10})**	0.2889	**
11	Changing Expenditure Allocation on Health **(X_{11})**	0.0296	
13	Change in Listening to Radio **(X_{12})**	-0.0732	
14	Change in Watching T.V **(X_{13})**	0.0983	
15	Changing Interaction with Input Dealers **(X_{14})**	-0.1882	
16	Changing Interaction with Extension Agent **(X_{15})**	-0.1012	
17	Change in Farm Size **(X_{16})**	0.2133	
19	Changing Cropping Intensity **(X_{17})**	-0.2157	
19	Changing Cultivable Land **(X_{18})**	0.4225	**
20	Change in Fertilizer Application **(X_{19})**	-0.2011	
	r>0.220 significant at p=0.05(*) r>0.287 significant at p=0.01(**)		

Table 7 presents the coefficient of correlation between Change in Family income (Y_6) and 19 independent variables.

ISBN: 978-93-85822-01-8

Results: It has been found that variables like, Education (X_2), Family Education Status (X_4), Change in Consumption of Petrol (X_7), Changing Family Expenditure (X_8), Changing Expenditure Allocation on Education (X_{10}), Changing Cultivable Land (X_{18}), have shown positive significant correlation & variable, Changing Expenditure Allocation on Farming (X_9), has shown negative but significant correlation with the dependent variable, Change in Family income (Y_6).

Model-6



X2-Education, X4-Family Education Status, X7-Change in Consumption of Petrol, X8-Changing Family Expenditure, X9-Changing Expenditure Allocation on Farming, X10-Changing Expenditure Allocation on Education, X18-Changing Cultivable Land.
Y6- Change in Family Income

Revelation: The higher the education, better is the job opportunity, service and better income as well. Higher family education status increases family income through diversified service. Educated farmers prefer modernized farming, which needs higher investments, provide better outcomes. More

consumption of diesel, refers to more mechanization of farming, which stimulates the income level. Through adopting modernization and mechanization of farming, large farmers, having more land get benefited more.

Table No. 31: Coefficient of Correlation(r): Change in Weed diversity (Y_6) vs 19 independent variables

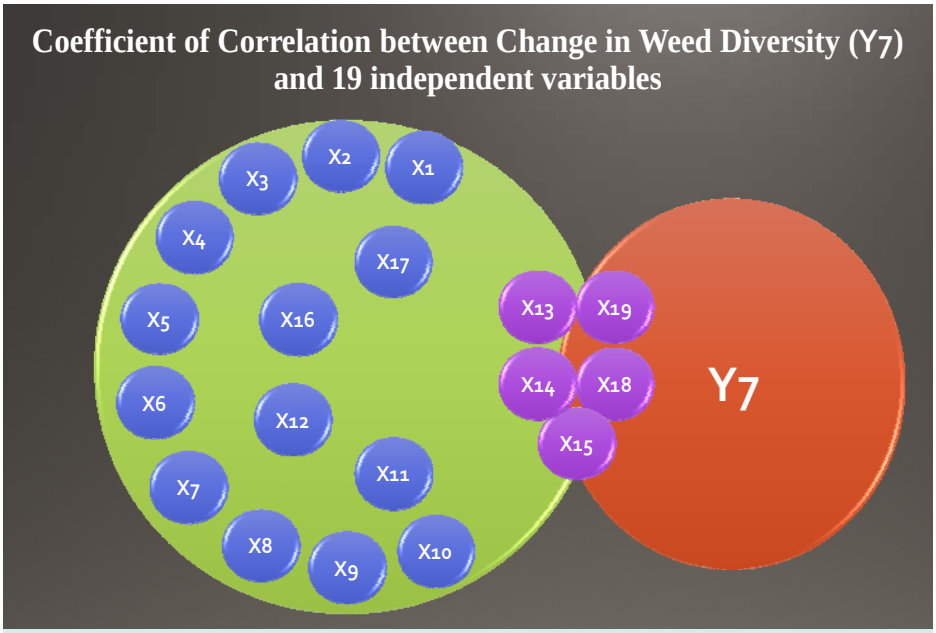
Sl. No.	Variables	R value	Remarks
1.	Age **(X_1)**	-0.0034	
2.	Education **(X_2)**	0.0631	
3.	Family Size **(X_3)**	-0.0256	
4.	Family Education Status **(X_4)**	0.1273	
5.	No. of Vehicles changed **(X_5)**	0.0707	
6.	Change in Consumption of Kerosene **(X_6)**	0.1337	
7.	Change in Consumption of Petrol **(X_7)**	0.0843	
8.	Changing Family Expenditure **(X_8)**	0.2097	
9.	Changing Expenditure Allocation on Farming **(X_9)**	-0.0087	
10.	Changing Expenditure Allocation on Education **(X_{10})**	0.0570	
11.	Changing Expenditure Allocation on Health **(X_{11})**	0.0100	
12.	Change in Listening to Radio **(X_{12})**	-0.0157	
13.	Change in Watching T.V **(X_{13})**	-0.2747	*
14.	Changing Interaction with Input Dealers **(X_{14})**	-0.2791	*
15.	Changing Interaction with Extension Agent **(X_{15})**	-0.2526	*
16.	Change in Farm Size **(X_{16})**	0.1844	
17.	Changing Cropping Intensity **(X_{17})**	-0.1319	
18.	Changing Cultivable Land **(X_{18})**	0.3761	**
19.	Change in Fertilizer Application **(X_{19})**	-0.3253	**
	r>0.220 significant at p=0.05(*) r>0.287 significant at p=0.01(**)		

ISBN: 978-93-85822-01-8

Table 31 presents the coefficient of correlation between Change in Weed diversity (Y_7) and 19 independent variables.

Results: It has been found that variables like, Change in Watching T.V (X_{13}), Changing Interaction with Input Dealers (X_{14}), Changing Interaction with Extension Agent (X_{15}), Change in Fertilizer Application (X_{19}), have exerted negative whereas variable, Changing Cultivable Land (X_{18}), has exerted positive but significant correlation with the dependent variable, Change in Weed diversity (Y_7).

Model-7



X13-Change in Watching T.V, X14-Changing Interaction with Input Dealers, X15-Changing Interaction with Extension Agent, X18-Changing Cultivable Land, X19-Change in Fertilizer application.

y7- Change in Weed Diversity

ISBN: 978-93-85822-01-8

Revelation: Watching more Television and interacting with input dealer & with extension agent, make farmers more cosmopolite. That cosmopolite nature helps farmers control the weed diversity through adopting appropriate management. Increase in fertilizer use, decreases weed diversity whereas more the cultivable land, farmer faces more weed attack as well.

Table No. 32: Coefficient of Correlation(r): Change in Crop disease intensity (Y_8) vs 19 independent variables

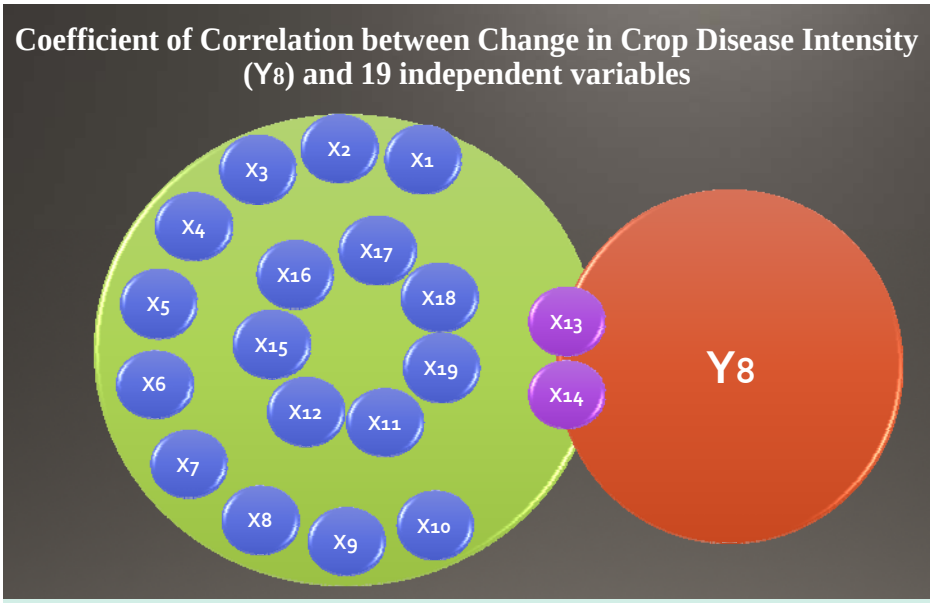
Sl. No.	Variables	R value	Remarks
1.	Age **(X_1)**	0.1138	
2.	Education **(X_2)**	0.1187	
3.	Family Size **(X_3)**	0.0891	
4.	Family Education Status **(X_4)**	0.1915	
5.	No. of Vehicles changed **(X_5)**	-0.1554	
6.	Change in Consumption of Kerosene **(X_6)**	0.0423	
7.	Change in Consumption of Petrol **(X_7)**	0.1121	
8.	Changing Family Expenditure **(X_8)**	0.1251	
9.	Changing Expenditure Allocation on Farming **(X_9)**	-0.1236	
10.	Changing Expenditure Allocation on Education **(X_{10})**	0.0509	
11.	Changing Expenditure Allocation on Health **(X_{11})**	-0.0820	
12.	Change in Listening to Radio **(X_{12})**	0.0493	
13.	Change in Watching T.V **(X_{13})**	-0.2326	*
14.	Changing Interaction with Input Dealers **(X_{14})**	-0.3367	**
15.	Changing Interaction with Extension Agent **(X_{15})**	-0.1587	
16.	Change in Farm Size **(X_{16})**	0.1224	
17.	Changing Cropping Intensity **(X_{17})**	-0.0299	
18.	Changing Cultivable Land **(X_{18})**	0.1978	
19.	Change in Fertilizer Application **(X_{19})**	0.1063	
	r>0.220 significant at p=0.05(*) r>0.287 significant at p=0.01(**)		

Table 9 presents the coefficient of correlation between Change in Crop disease intensity (Y_8) and 19 independent variables.

ISBN: 978-93-85822-01-8

Results: Variables like, Change in Watching T.V (X_{13}), Changing Interaction with Input Dealers (X_{14}), have been found, negative but significant correlation with variable, Change in Crop disease intensity (Y_8)

Model- 8



X13-Change in Watching T.V, X14-Changing Interaction with Input Dealers .
Y8- Change in Crop Disease Intensity

Revelation: More watching of Television and interacting with input dealer, help farmers to widen their knowledge to control disease intensity with respect to climate change perception by taking proper preventive and management practices. More watching of Television and more interacting with input dealer, ultimately lead to decrease in disease infestation.

ISBN: 978-93-85822-01-8

Table No. 33: Coefficient of Correlation(r): Change in Insect-pest intensity (Y_9) vs 19 independent variables

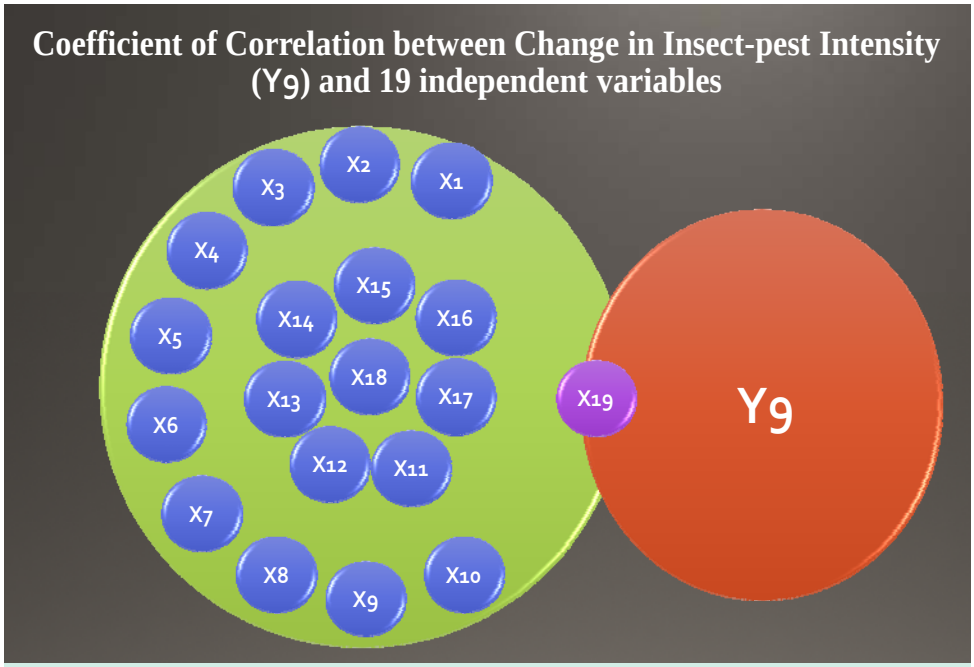
Sl. No.	Variables	R value	Remarks
1.	Age **(X_1)**	0.1986	
2.	Education **(X_2)**	0.0126	
3.	Family Size **(X_3)**	0.1883	
4.	Family Education Status **(X_4)**	0.1053	
5.	No. of Vehicles changed **(X_5)**	-0.0013	
6.	Change in Consumption of Kerosene **(X_6)**	-0.1857	
7.	Change in Consumption of Petrol **(X_7)**	0.1884	
8.	Changing Family Expenditure **(X_8)**	0.0300	
9.	Changing Expenditure Allocation on Farming **(X_9)**	0.0137	
10.	Changing Expenditure Allocation on Education **(X_{10})**	-0.0072	
11.	Changing Expenditure Allocation on Health **(X_{11})**	0.1086	
12.	Change in Listening to Radio **(X_{12})**	0.0289	
13.	Change in Watching T.V **(X_{13})**	-0.2062	
14.	Changing Interaction with Input Dealers **(X_{14})**	0.0290	
15.	Changing Interaction with Extension Agent **(X_{15})**	-0.0031	
16.	Change in Farm Size **(X_{16})**	-0.0745	
17.	Changing Cropping Intensity **(X_{17})**	0.0183	
18.	Changing Cultivable Land **(X_{18})**	-0.0735	
19.	Change in Fertilizer Application **(X_{19})**	0.4171	**
	r>0.220 significant at p=0.05(*) r>0.287 significant at p=0.01(**)		

Table 10 presents the coefficient of correlation between Change in Insect-pest intensity (Y_9) and 19 independent variables.

ISBN: 978-93-85822-01-8

Results: It has been found that, variable Change in Fertilizer Application (X_{19}), has recorded positive significant correlation with dependent variable, Change in Insect-Pest intensity (Y_9).

Model- 9



X19-Change in Fertilizer application

Y9- Change in Insect-pest Intensity

Revelation: The increase in fertilizer application, gradually reduces plant resistance to insect-pest attack and makes plant susceptible. So, with increase of fertilizer consumption and increase in adverse effect of climate change, have leaded to emergence of more insect-pest and also increases their resistant to insecticides. This has been a unique perceptual analysis by the respondents.

ISBN: 978-93-85822-01-8

Table No. 34: Coefficient of Correlation(r): Perceived Climate change effect (Y_{10}) vs 19 independent variables

Sl. No.	Variables	R value	Remarks
1.	Age **(X_1)**	-0.1208	
2.	Education **(X_2)**	0.1000	
3.	Family Size **(X_3)**	0.0657	
4.	Family Education Status **(X_4)**	0.1323	
5.	No. of Vehicles changed **(X_5)**	0.1528	
6.	Change in Consumption of Kerosene **(X_6)**	-0.0564	
7.	Change in Consumption of Petrol **(X_7)**	0.0925	
8.	Changing Family Expenditure **(X_8)**	0.2054	
9.	Changing Expenditure Allocation on Farming **(X_9)**	-0.1817	
10.	Changing Expenditure Allocation on Education**(X_{10})**	0.2231	*
11.	Changing Expenditure Allocation on Health **(X_{11})**	0.1568	
12.	Change in Listening to Radio **(X_{12})**	0.0656	
13.	Change in Watching T.V **(X_{13})**	-0.0115	
14.	Changing Interaction with Input Dealers **(X_{14})**	0.0723	
15.	Changing Interaction with Extension Agent **(X_{15})**	0.0458	
16.	Change in Farm Size **(X_{16})**	0.0849	
17.	Changing Cropping Intensity **(X_{17})**	0.0238	
18.	Changing Cultivable Land **(X_{18})**	0.2612	*
19.	Change in Fertilizer Application **(X_{19})**	0.0353	
	r>0.220 significant at p=0.05(*) r>0.287 significant at p=0.01(**)		

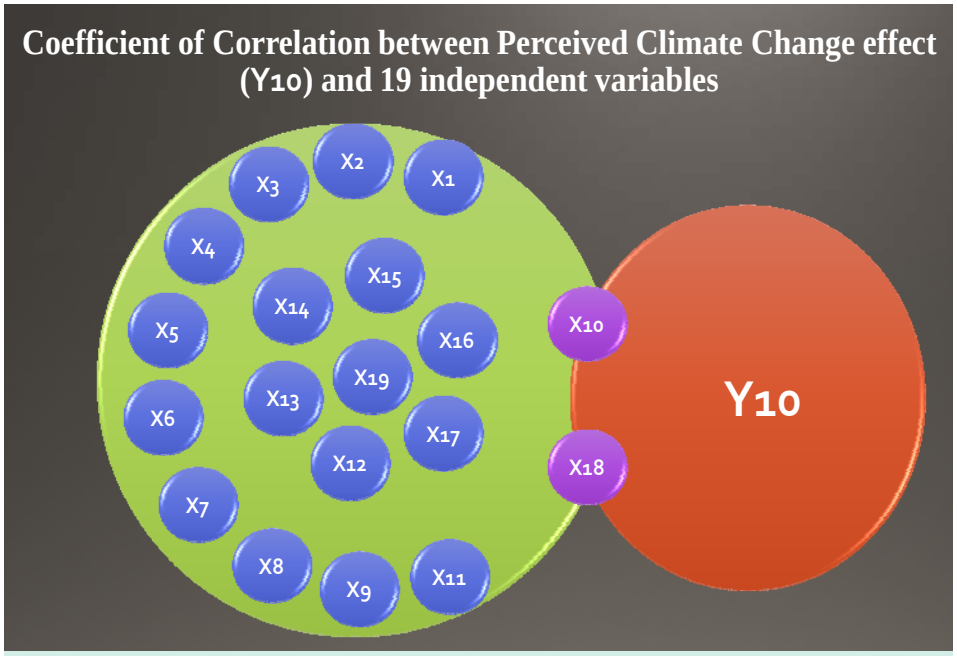
Table 11 presents the coefficient of correlation between Perceived Climate change effect (Y_{10}) and 19 independent variables.

Results: It has been found that two variables, Changing Expenditure Allocation on Education (X_{10}) and Changing Cultivable Land (X_{18}), have

ISBN: 978-93-85822-01-8

positive significant correlation with the dependent variable, Perceived Climate change effect (Y_{10}).

Model- 10



X10- Changing Expenditure Allocation on Education, X18- Change in Cultivable land

Y10- Perceived Climate Change Effect

Revelation: The change in expenditure allocation on education and cultivable land, have exerted positive effect on perceived climate change. Educated people have better perceptual effect of climate change. Large farmers are getting more affected by the effect of climate change due to more loss and brunt as evinced by the perceptual analysis of the respondents.

ISBN: 978-93-85822-01-8

Table No. 35: Coefficient of Correlation(r): Perceived Climate changing effect on Agriculture (Y_{11}) vs 19 independent variables

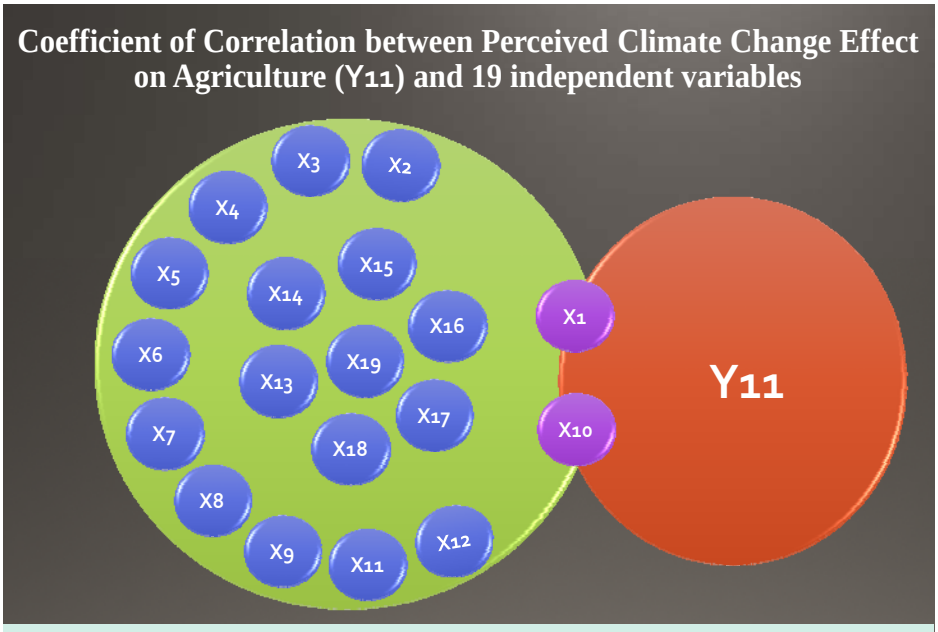
Sl. No.	Variables	R value	Remarks
1.	Age **(X_1)**	-0.3094	**
2.	Education **(X_2)**	0.0495	
3.	Family Size **(X_3)**	-0.0097	
4.	Family Education Status **(X_4)**	0.1180	
5.	No. of Vehicles changed **(X_5)**	0.1471	
6.	Change in Consumption of Kerosene **(X_6)**	-0.0955	
7.	Change in Consumption of Petrol **(X_7)**	0.1292	
8.	Changing Family Expenditure **(X_8)**	0.1310	
9.	Changing Expenditure Allocation on Farming **(X_9)**	-0.1248	
10.	Changing Expenditure Allocation on Education **(X_{10})**	0.3081	**
11.	Changing Expenditure Allocation on Health **(X_{11})**	0.1103	
12.	Change in Listening to Radio **(X_{12})**	-0.0555	
13.	Change in Watching T.V **(X_{13})**	0.0656	
14.	Changing Interaction with Input Dealers **(X_{14})**	0.1007	
15.	Changing Interaction with Extension Agent **(X_{15})**	0.0206	
16.	Change in Farm Size **(X_{16})**	0.1215	
17.	Changing Cropping Intensity **(X_{17})**	-0.0499	
18.	Changing Cultivable Land **(X_{18})**	0.1394	
19.	Change in Fertilizer Application **(X_{19})**	-0.0494	
	r>0.220 significant at p=0.05(*) r>0.287 significant at p=0.01(**)		

Table 12 presents the coefficient of correlation between Perceived Climate change effect on Agriculture (Y_{11}) and 19 independent variables.

ISBN: 978-93-85822-01-8

Results: It has been found that variable, Age (X_1), has recorded strong negative significant correlation whereas variable, Changing Expenditure Allocation on Education (X_{10}), has recorded positive significant correlation with dependent variable, Perceived Climate change effect on Agriculture (Y_{11}).

Model- 11



Revelation: The young farmers are recognising effect of climate change on agriculture more than old age. Increasing expenditure on education leads to higher education and better perception on climate change effect on agriculture. Older traditional farmers are unable to recognise the brunt of

ISBN: 978-93-85822-01-8

climate change on agriculture. So, Age and Expenditure Allocation on Education, are two vital factor to estimate perception on climate change.

8.2 REGRESSION ANALYSIS

Table 36: Regression analysis: Change in Perceived effect of Radio (Y_1) vs 19 causal variables (X_1-X_{19}) Multiple R sq- 0.6772

S.L. No.	Variables	Beta	Beta x R	Reg. coef. B	S, error B	t value
1.	Age **(X_1)**	0.098	1.055	0.024	0.025	0.955
2.	Education **(X_2)**	0.061	-1.793	0.035	0.077	0.459
3.	Family Size **(X_3)**	-0.064	10123	-0.072	0.109	0.659
4.	Family Education Status **(X_4)**	-0.133	6.086	-0.139	0.148	0.934
5.	No. of Vehicles changed **(X_5)**	-0.061	2.053	-0.169	0.268	0.631
6.	Change in Consumption of Kerosene **(X_6)**	-0.182	-8.209	-0.356	0.206	1.728
7.	Change in Consumption of Petrol **(X_7)**	-0.176	9.320	-0.040	0.026	1.566
8.	Changing Family Expenditure **(X_8)**	0.037	-1.222	0.000	0.001	0.289
9.	Changing Expenditure Allocation on Farming **(X_9)**	-0.111	1.308	-0.024	0.022	1.102
10	Changing Expenditure Allocation on Education **(X_{10})**	0.115	-1.144	0.033	0.031	1.065
11	Changing Expenditure Allocation on Health **(X_{11})**	-0.072	-0.209	-0.031	0.036	0.857

ISBN: 978-93-85822-01-8

12	Change in Listening to Radio **(X_{12})**	0.674	72.555	0.047	0.006	7.621
13	Change in Watching T.V **(X_{13})**	-0.266	19.752	-0.027	0.010	2.591
14	Changing Interaction with Input Dealers **(X_{14})**	0.085	-0.602	0.096	0.110	0.879
15	Changing Interaction with Extension Agent **(X_{15})**	0.104	-1.287	0.095	0.090	1.056
16	Change in Farm Size **(X_{16})**	-0.101	1.132	-0.811	0.828	0.979
17	Changing Cropping Intensity **(X_{17})**	-0.107	-0.110	-0.009	0.007	1.280
18	Changing Cultivable Land **(X_{18})**	0.005	-0.102	0.017	0.424	0.041
19	Change in Fertilizer Application **(X_{19})**	-0.121	0.294	-0.012	0.009	1.266

The table 13 presents the Regression Analysis to estimate the causal effects of 19 exogenous variables on the respective consequent variable, Change in Perceived effect of Radio (Y_1).

Revelation: It has been found that two variables, Change in Listening to Radio (X_{12}), Change in Watching T.V (X_{13}), have contributed the highest variance to the consequent variable Change in Perceived effect of Radio (Y_1). This result is in well compliance with the coefficient of correlation as well. Change in Listening to Radio (X_{12}), has the highest contribution i.e. 72.56% whereas variable, Change in Watching T.V (X_{13}), has contributed 19.75% to the changing perceived effect of Radio (Y_1). More change in listening to radio is the cause of higher perceived effect of radio whereas less preference of Television increases perceived effect of radio.

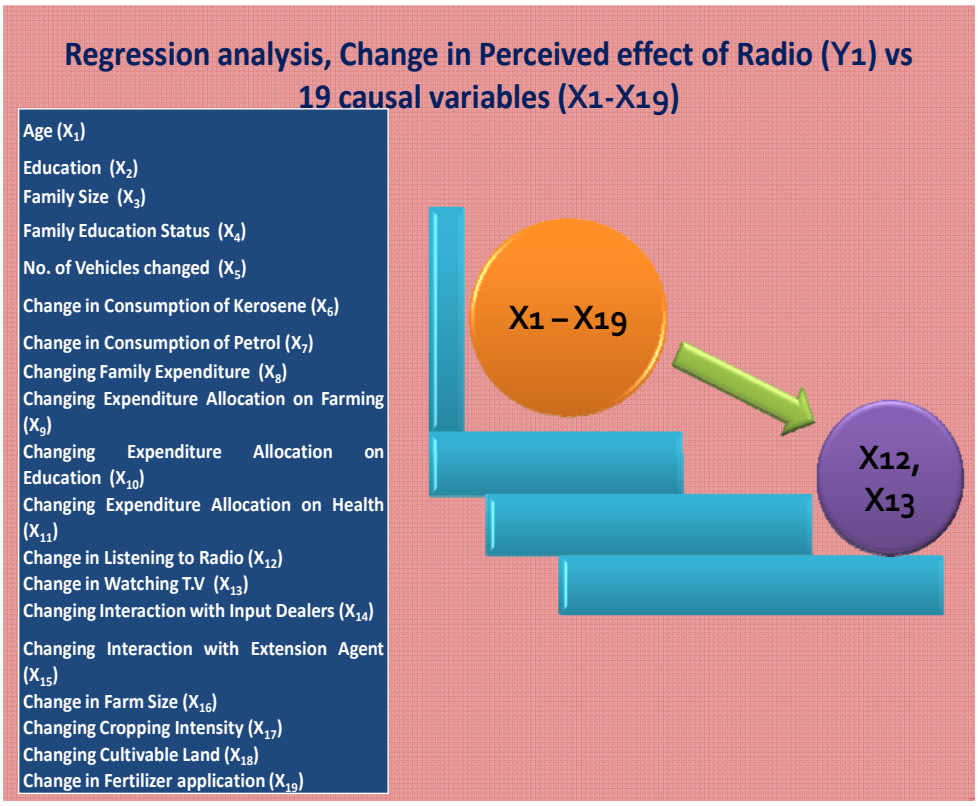
ISBN: 978-93-85822-01-8

So, these two variables can be indicator variables to measure the changing perceived effect of radio. The R-sq vale is 0.6772 which implies that with the combination of 19 exogenous variables, 67.72% of variance embedded in consequent variable Change in Perceived effect of Radio (y1).

Step-down Regression analysis **Multiple R sq= 0.5807**

Variable	Beta	t-value
Change in Listening to Radio (X_{12})	0.628	7.750
Change in Watching T.V (X_{13})	-0.243	2.999

Model-12



ISBN: 978-93-85822-01-8

Table 37: Regression analysis: Change in Perceived effect of T.V. (Y_2) vs 19 causal variables (X_1-X_{19}) Multiple R sq.- 0.6910

S.L. No.	Variables	Beta	Beta x R	Reg. coef. B	S, error B	t value
1.	Age (X_1)	-0.156	6.928	-0.028	0.018	1.556
2.	Education (X_2)	0.062	2.723	0.027	0.057	0.474
3.	Family Size (X_3)	-0.003	-0.003	-0.002	0.080	0.029
4.	Family Education Status (X_4)	-0.069	-3.031	-0.054	0.109	0.497
5.	No. of Vehicles changed (X_5)	-0.028	-1.159	-0.059	0.197	0.300
6.	Change in Consumption of Kerosene (X_6)	-0.011	0.655	-0.016	0.151	0.106
7.	Change in Consumption of Petrol (X_7)	0.063	3.052	0.011	0.019	0.571
8.	Changing Family Expenditure (X_8)	0.104	3.606	0.000	0.000	0.829
9.	Changing Expenditure Allocation on Farming (X_9)	0.096	0.146	0.016	0.016	0.969
10	Changing Expenditure Allocation on Education (X_{10})	-0.023	-0.753	-0.005	0.023	0.218
11	Changing Expenditure Allocation on Health (X_{11})	0.136	2.050	0.043	0.026	1.646
12	Change in Listening to Radio (X_{12})	-0.201	13.646	-0.010	0.005	2.326
13	Change in Watching T.V (X_{13})	0.608	67.594	0.046	0.008	6.062

ISBN: 978-93-85822-01-8

14	Changing Interaction with Input Dealers (X_{14})	0.029	1.079	0.025	0.080	0.306
15	Changing Interaction with Extension Agent (X_{15})	0.060	3.005	0.041	0.066	0.617
16	Change in Farm Size (X_{16})	0.090	0.986	0.543	0.608	0.893
17	Changing Cropping Intensity (X_{17})	0.040	0.022	0.003	0.005	0.483
18	Changing Cultivable Land (X_{18})	-0.079	-1.115	-0.205	0.311	0.659
19	Change in Fertilizer Application (X_{19})	0.060	0.569	0.004	0.007	0.640

The table 14 presents the Regression Analysis to estimate the causal effects of 19 exogenous variables on the respective consequent variable, Change in Perceived effect of T.V. (Y_2).

Result: It has been found that variables, Change in Listening to Radio (X_{12}), Change in Watching T.V (X_{13}) have contributed respectively to the extent of 13.65% & 67.59% of the variance to the consequent variable, Change in Perceived effect of T.V. (Y_2).

Revelation: Watching Television in changing and modernizing social ecology of rural Odisha, has prompted to better perception on change dynamics. It is less in case of listening to Radio.

So, these two variables can be indicator variables to measure the Change in Perceived effect of T.V. (Y_2). The R-sq vale is 0.6910 which implies that, with the combination of 19 exogenous variables, 69.10% of variance embedded in consequent variable i.e. Change in Perceived effect of T.V. (Y_2).

ISBN: 978-93-85822-01-8

Step-down Regression analysis **Multiple R sq=0.6404**

Variable	Beta	t-value
Changing Expenditure Allocation on Health (X_{11})	0.152	2.210
Change in Listening to Radio (X_{12})	-0.185	2.446
Change in Watching T.V (X_{13})	0.700	9.256

Model-13

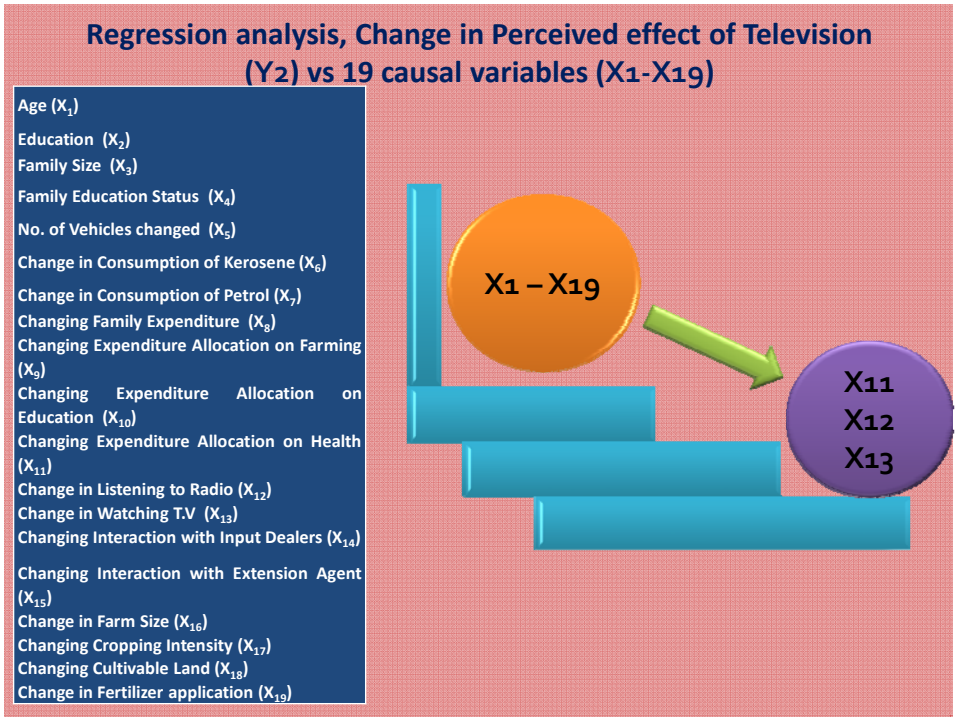


Table 38: Regression analysis: Change in Perceived effect of Input dealer (Y_3) vs 19 causal variables (X_1-X_{19}) Multiple R sq.- 0.5355

S.L. No.	Variables	Beta	Beta x R	Reg. coef. B	S, error B	t value
1.	Age **(X_1)**	-0.057	-0.619	-0.011	0.024	0.466
2.	Education **(X_2)**	-0.223	4.841	-0.106	0.076	1.391

ISBN: 978-93-85822-01-8

3.	Family Size **(X_3)**	0.118	5.727	0.109	0.108	1.003
4.	Family Education Status **(X_4)**	0.129	-3.405	0.110	0.147	0.752
5.	No. of Vehicles changed **(X_5)**	0.045	0.493	0.102	0.264	0.385
6.	Change in Consumption of Kerosene **(X_6)**	0.028	-0.757	0.045	0.404	0.221
7.	Change in Consumption of Petrol **(X_7)**	-0.075	0.444	-0.014	0.205	0.559
8.	Changing Family Expenditure **(X_8)**	-0.026	1.085	0.000	0.001	0.169
9.	Changing Expenditure Allocation on Farming **(X_9)**	-0.316	1.723	-0.057	0.022	2.611
10	Changing Expenditure Allocation on Education **(X_{10})**	-0.197	1.925	-0.047	0.031	1.518
11	Changing Expenditure Allocation on Health **(X_{11})**	0.161	8.052	0.056	0.035	1.588
12	Change in Listening to Radio **(X_{12})**	-0.126	2.240	-0.007	0.006	1.189
13	Change in Watching T.V **(X_{13})**	-0.111	0.813	-0.009	0.010	0.905
14	Changing Interaction with Input Dealers **(X_{14})**	0.684	76.758	0.639	0.108	5.900
15	Changing Interaction with Extension Agent **(X_{15})**	-0.106	-2.207	-0.080	0.089	0.896
16	Change in Farm Size **(X_{16})**	-0.078	3.002	-0.517	0.819	0.632
17	Changing Cropping Intensity **(X_{17})**	-0.054	-0.619	-0.004	0.007	0.532
18	Changing Cultivable Land **(X_{18})**	-0.046	1.602	-0.130	0.419	0.311
19	Change in Fertilizer Application **(X_{19})**	-0.085	-1.100	-0.007	0.009	0.740

ISBN: 978-93-85822-01-8

The table 15 presents the Regression Analysis to estimate the causal effects of 19 exogenous variables on the respective consequent variable, Change in Perceived effect of Input dealer (Y_3).

Result: It has been found that variable, Changing Interaction with Input Dealers (X_{14}), has contributed 76.76% of variance to the consequent variable Change in Perceived effect of Input dealer (Y_3).

Revelation: Change in interaction with input dealers result in change in perceived effect of input dealer on change dynamics. More interaction with input dealers, stimulates the knowledge of farmers in input management with respect to change pattern that implies higher perceived effect of Input dealer.

So, this variable can be indicator variable as to measure the Change in Perceived effect of Input dealer (Y_3). The R-sq. vale is 0.5355 which implies that 53.55% of variance embedded inconsequent variable i.e. Change in Perceived effect of Input dealer (Y_3) with the combination of 19 exogenous variables.

Step-down Regression analysis Multiple R sq.= 0.3611

Variable	**Beta**	**t-value**
Changing Interaction with Input Dealers (X_{14})	0.601	6.639

ISBN: 978-93-85822-01-8

Model-14

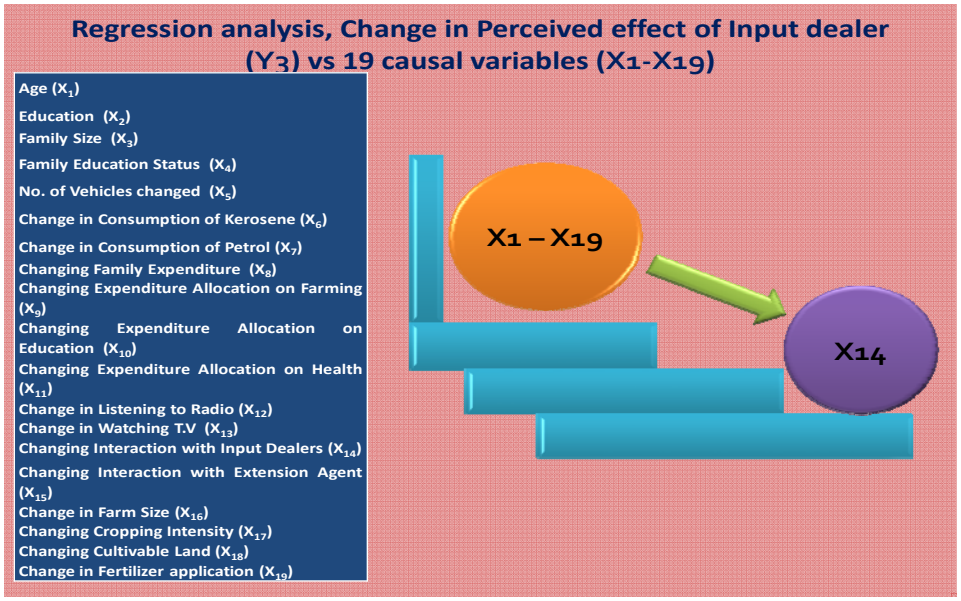


Table 39: Regression analysis: Change in Perceived effect of Extension agent (y4) vs 19 causal variables (X_1-X_{19}) Multiple R sq.- 0.4845

S.L. No.	Variables	Beta	Beta x R	Reg. coef. B	S, error B	t value
1.	Age **(X_1)**	0.004	0.004	0.001	0.016	0.034
2.	Education **(X_2)**	-0.018	-0.096	-0.005	0.051	0.105
3.	Family Size **(X_3)**	0.068	1.519	0.040	0.073	0.553
4.	Family Education Status **(X_4)**	0.026	0.151	0.014	0.098	0.143
5.	No. of Vehicles changed **(X_5)**	0.051	1.336	0.075	0.178	0.419
6.	Change in Consumption of Kerosene **(X_6)**	0.099	-3.061	0.101	0.137	0.739
7.	Change in Consumption of Petrol **(X_7)**	-0.087	-0.572	-0.010	0.017	0.613
8.	Changing Family Expenditure **(X_8)**	-0.049	0.372	0.000	0.000	0.302

ISBN: 978-93-85822-01-8

9.	Changing Expenditure Allocation on Farming **(X_9)**	-0.088	-0.623	-0.010	0.015	0.690
10	Changing Expenditure Allocation on Education **(X_{10})**	-0.149	0.474	-0.022	0.021	1.090
11	Changing Expenditure Allocation on Health **(X_{11})**	0.060	-0.230	0.013	0.024	0.561
12	Change in Listening to Radio **(X_{12})**	0.126	0.318	0.005	0.004	1.131
13	Change in Watching T.V **(X_{13})**	0.349	22.908	0.018	0.007	2.692
14	Changing Interaction with Input Dealers **(X_{14})**	-0.119	-4.245	-0.071	0.073	0.970
15	Changing Interaction with Extension Agent **(X_{15})**	0.343	35.846	0.165	0.060	2.748
16	Change in Farm Size **(X_{16})**	-0.017	0.050	-0.071	0.549	0.130
17	Changing Cropping Intensity **(X_{17})**	-0.107	-0.351	-0.005	0.005	1.006
18	Changing Cultivable Land **(X_{18})**	0.163	2.239	0.297	0.281	1.057
19	Change in Fertilizer Application **(X_{19})**	0.431	43.960	0.022	0.006	3.554

The table 16 presents the Regression Analysis to estimate the causal effects of 19 exogenous variables on the respective consequent variable, Change in Perceived effect of Extension agent (Y_4).

Result: It has been found that, two variables, Changing Interaction with Extension Agent (X_{15}), Change in Fertilizer Application (X_{19}), have recorded substantive impact on Change in Perceived effect of Extension agent (Y_4), respectively contributed 43.96% & 35.85% of variance in Change in Perceived effect of Extension agent (Y_4).

Revelation: Change pattern in fertilizer use and change in interaction with extension agent have contributed in generating perception on change pattern

ISBN: 978-93-85822-01-8

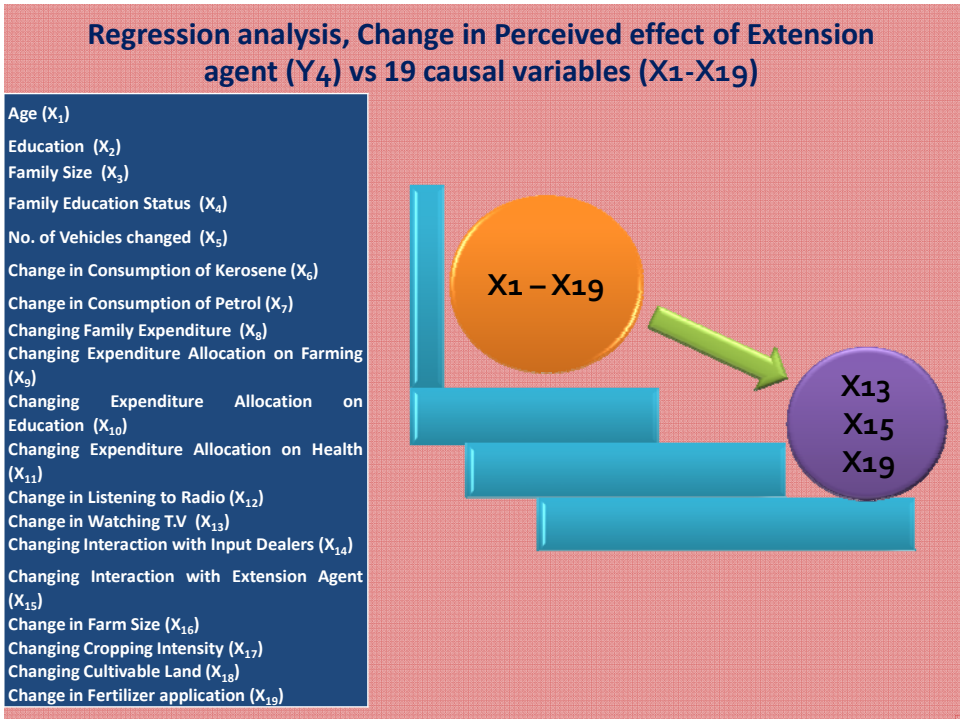
recorded by extension agent. Increasing fertilizer use leads to more investment, which make farmer more protective with respects climate change scenario.

The R-sq. vale is 0.4845, which implies that with the combination of 19 exogenous variables, 48.45% of variance embedded with consequent variable i.e. Change in Perceived effect of Extension agent (Y_4).

Step-down Regression analysis **Multiple R sq.= 0.4007**

Variable	Beta	t-value
Change in Watching T.V (X_{13})	0.214	2.279
Changing Interaction with Extension Agent (X_{15})	0.292	2.856
Change in Fertilizer Application (X_{19})	0.374	3.850

Model-15



ISBN: 978-93-85822-01-8

Table 40: Regression analysis: Change in Productivity (Y_5) vs 19 causal variables (X_1-X_{19}) Multiple R sq.- 0.7332

S.L. No.	Variables	Beta	Beta x R	Reg. coef. B	S, error B	t value
1.	Age **(X_1)**	0.091	3.213	0.029	0.030	0.980
2.	Education **(X_2)**	0.052	0.150	0.040	0.093	0.429
3.	Family Size **(X_3)**	0.075	3.025	0.112	0.132	0.844
4.	Family Education Status **(X_4)**	0.034	-0.020	0.047	0.179	0.263
5.	No. of Vehicles changed **(X_5)**	-0.181	3.646	-0.669	0.324	2.063
6.	Change in Consumption of Kerosene **(X_6)**	-0.164	5.067	-0.425	0.249	1.706
7.	Change in Consumption of Petrol **(X_7)**	-0.120	0.075	-0.037	0.031	1.172
8.	Changing Family Expenditure **(X_8)**	-0.006	0.125	0.000	0.001	0.050
9.	Changing Expenditure Allocation on Farming **(X_9)**	-0.091	-0.598	-0.026	0.027	0.989
10	Changing Expenditure Allocation on Education **(X_{10})**	-0.249	7.365	-0.095	0.038	2.538
11	Changing Expenditure Allocation on Health **(X_{11})**	0.002	-0.017	0.001	0.043	0.022
12	Change in Listening to Radio **(X_{12})**	0.121	1.780	0.011	0.007	1.505
13	Change in Watching T.V **(X_{13})**	0.127	-0.025	0.017	0.012	1.362
14	Changing Interaction with Input Dealers **(X_{14})**	0.003	0.091	0.005	0.132	0.036
15	Changing Interaction with Extension Agent **(X_{15})**	-0.043	-1.460	-0.053	0.109	0.481

ISBN: 978-93-85822-01-8

16	Change in Farm Size **(X_{16})**	-0.053	1.532	-0.570	1.001	0.569
17	Changing Cropping Intensity **(X_{17})**	0.063	2.568	0.007	0.009	0.830
18	Changing Cultivable Land **(X_{18})**	0.146	-2.672	0.674	0.513	1.315
19	Change in Fertilizer Application **(X_{19})**	0.703	76.157	0.092	0.011	8.046

The table 17 presents the Regression Analysis to estimate the causal effects of 19 exogenous variables on the respective consequent variable, Change in Productivity (Y_5).

Result: It has been found that the variables like Expenditure Allocation on Education (X_{10}), Change in Fertilizer Application (X_{19}), have contributed to the extent of 7.37 percent and 76.16 percent of variance to the total R sq. value.

Revelation: Change in fertilizer application affect the production and productivity level of field crops. Day by day, higher in fertilizer application results the higher productivity. Change in expenditure on education leads to change in knowledge level. Acquiring more knowledge on new technologies and methods, increases the productivity level.

Therefore these two variables can be indicator variables to measure the Change in Productivity level. The R-sq. value is 0.7332 which implies that with the combination of 19 exogenous variables, 73.32% of variance embedded in consequent variable, Change in Productivity (Y_5).

Step-down Regression analysis **Multiple R Sq.= 0.6615**

Variable	Beta	t-value
Changing Expenditure Allocation on Education (X_{10})	-0.168	2.522
Change in average fertilizer dose (X_{19})	0.785	11.823

Model-16

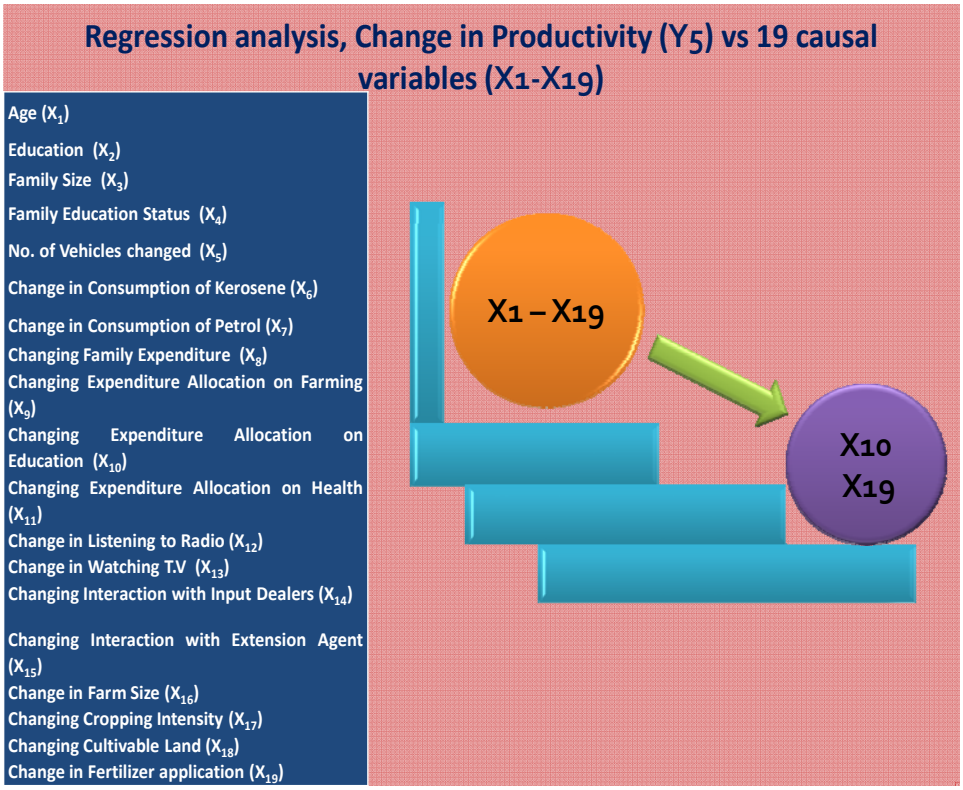


Table 41: Regression analysis: Change in Family income (Y_6) vs 19 causal variables (X_1-X_{19}) Multiple R sq.- 0.8273

S.L. No.	Variables	Beta	Beta x R	Reg. coef. B	S, error B	t value
1.	Age **(X_1)**	-0.019	0.308	-2.663	10.540	0.253
2.	Education **(X_2)**	0.074	4.529	24.845	32.978	0.753

ISBN: 978-93-85822-01-8

3.	Family Size **(X_3)**	0.040	-0.659	25.947	46.829	0.554
4.	Family Education Status **(X_4)**	0.063	4.109	38.181	63.482	0.601
5.	No. of Vehicles changed **(X_5)**	-0.113	0.995	-182.78	114.707	1.593
6.	Change in Consumption of Kerosene **(X_6)**	0.054	0.551	61.073	88.080	0.693
7.	Change in Consumption of Petrol **(X_7)**	-0.163	-7.023	-21.801	11.015	1.979
8.	Changing Family Expenditure **(X_8)**	0.920	96.980	2.781	0.285	9.773
9.	Changing Expenditure Allocation on Farming **(X_9)**	0.014	-0.394	1.778	9.457	0.188
10	Changing Expenditure Allocation on Education **(X_{10})**	-0.006	-0.197	-0.946	13.270	0.071
11	Changing Expenditure Allocation on Health **(X_{11})**	0.047	0.167	11.550	15.248	0.757
12	Change in Listening to Radio **(X_{12})**	0.055	-0.486	2.231	2.625	0.850
13	Change in Watching T.V **(X_{13})**	0.012	0.138	0.684	4.419	0.155
14	Changing Interaction with Input Dealers **(X_{14})**	0.021	-0.486	14.154	46.863	0.302
15	Changing Interaction with Extension Agent **(X_{15})**	-0.034	0.420	-18.325	38.616	0.475
16	Change in Farm Size **(X_{16})**	0.002	0.058	10.632	354.183	0.030
17	Changing Cropping Intensity **(X_{17})**	-0.091	2.381	-4.662	3.132	1.489

ISBN: 978-93-85822-01-8

18	Changing Cultivable Land **(X_{18})**	-0.040	-2.041	-81.011	181.480	0.446
19	Change in Fertilizer Application **(X_{19})**	-0.027	0.651	-1.539	4.032	0.382

The table 18 presents the Regression Analysis to estimate the causal effects of 19 exogenous variables on the respective consequent variable, Change in Family income (Y_6).

Result: It has been found that the variable, Changing Family Expenditure (X_8), has contributed to the extent of 96.98 percent of variance to the consequent variable, Change in Family income (Y_6).

Revelation: Changing Family expenditure is the reflection of changing family income. More family expenditure that includes expenditure on education, food, health, farming etc. results getting of good service, good health, good production, which generates higher family income.

So, Changing Family Expenditure is an indicator variable for the measurement of changing family income. The R-sq. value is 0.8273, which implies that with the combination of 19 exogenous variables, 82.73% of variance embedded in consequent variable, Change in Family income (Y_6).

Step-down Regression analysis Multiple R sq.= 0.8065

Variable	Beta	t-value
Education (X_2)	0.130	2.139
No. of Vehicles changed (X_5)	-0.142	2.752
Change in Consumption of Petrol (X_7)	-0.159	2.557
Changing Family Expenditure (X_8)	0.902	13.999

ISBN: 978-93-85822-01-8

Model-17

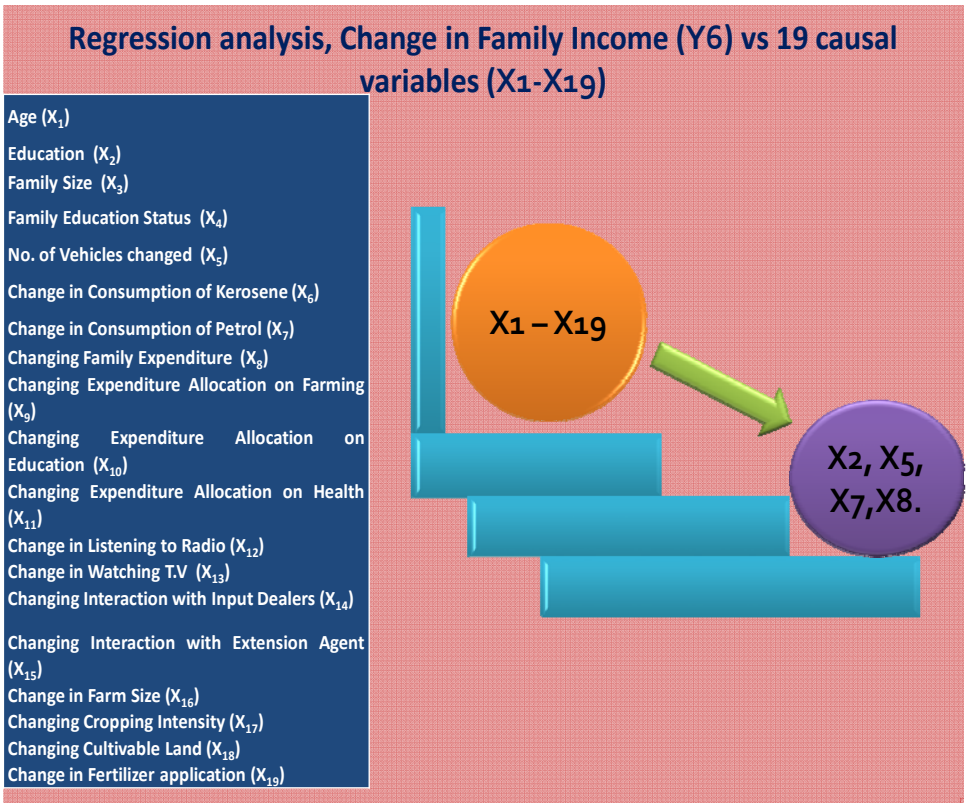


Table 42: Regression analysis: Change in Weed diversity (Y_7) vs 19 causal variables (X_1-X_{19}) Multiple R sq.- 0.3972

S.L. No.	Variables	Beta	Beta x R	Reg. coef. B	S, error B	t value
1.	Age **(X_1)**	0.014	-0.012	0.011	0.115	0.097
2.	Education **(X_2)**	0.009	0.137	0.017	0.360	0.047
3.	Family Size **(X_3)**	-0.037	0.238	-0.142	0.512	0.277
4.	Family Education Status **(X_4)**	0.200	6.422	0.714	0.694	1.029
5.	No. of Vehicles changed **(X_5)**	0.059	1.046	0.558	1.254	0.445

ISBN: 978-93-85822-01-8

6.	Change in Consumption of Kerosene **(X_6)**	0.037	1.260	0.250	0.963	0.259
7.	Change in Consumption of Petrol **(X_7)**	0.160	3.390	0.125	0.120	1.040
8.	Changing Family Expenditure **(X_8)**	-0.219	-11.581	-0.004	0.003	1.246
9.	Changing Expenditure Allocation on Farming **(X_9)**	0.124	-0.272	0.093	0.103	0.901
10	Changing Expenditure Allocation on Education **(X_{10})**	0.070	1.007	0.069	0.145	0.475
11	Changing Expenditure Allocation on Health **(X_{11})**	0.062	0.155	0.089	0.167	0.536
12	Change in Listening to Radio **(X_{12})**	-0.094	0.370	-0.022	0.029	0.776
13	Change in Watching T.V **(X_{13})**	-0.400	27.665	-0.138	0.048	2.854
14	Changing Interaction with Input Dealers **(X_{14})**	-0.154	10.821	-0.597	0.512	1.166
15	Changing Interaction with Extension Agent **(X_{15})**	-0.033	2.099	-0.103	0.422	0.244
16	Change in Farm Size **(X_{16})**	-0.102	-4.733	-2.806	3.871	0.745
17	Changing Cropping Intensity **(X_{17})**	-0.021	0.689	-0.006	0.034	0.181
18	Changing Cultivable Land **(X_{18})**	0.463	43.807	5.485	1.984	2.765
19	Change in Fertilizer Application **(X_{19})**	-0.214	17.491	-0.072	0.044	1.629

ISBN: 978-93-85822-01-8

The table 19 presents the Regression Analysis to estimate the causal effects of 19 exogenous variables on the respective dependent variable, Change in Weed diversity (Y_7).

Result: It has been found that the variable, Changing Cultivable Land (X_{18}), Change in Watching T.V (X_{13}) & Change in Fertilizer Application (X_{19}), have contributed respectively to the extent of 43.81%, 27.67% & 17.49% of variance to the consequent variable, Change in Weed diversity (Y_7).

Revelation: More the change in cultivable land, the higher is the cause of frequent weed diversity i.e. the large farmers face the problem more of weed diversity than small farmers. With the more watching T.V. increases outlook on the growth of weed diversity in relation to change dynamics that enables farmer to take precautions, which decreases the weed diversity. Adequate fertilizer application in proper time minimizes the weed diversity in relation to climate change.

Therefore, these three variables, Changing Cultivable Land, Change in Watching T.V and Change in average fertilizer dose can be key indicators to measure change in weed diversity. The R-sq. value is 0.3972 which implies that 39.72% of variance embedded in consequent variable, Change in Weed diversity (Y_7) with the combination of 19 exogenous variables.

Step-down Regression analysis **Multiple R sq.= 0.3063**

Variable	Beta	t-value
Change in Watching T.V (X_{13})	-0.309	3.210
Changing Cultivable Land (X_{18})	0.369	3.778
Change in Fertilizer Application (X_{19})	-0.254	2.617

ISBN: 978-93-85822-01-8

Model-18

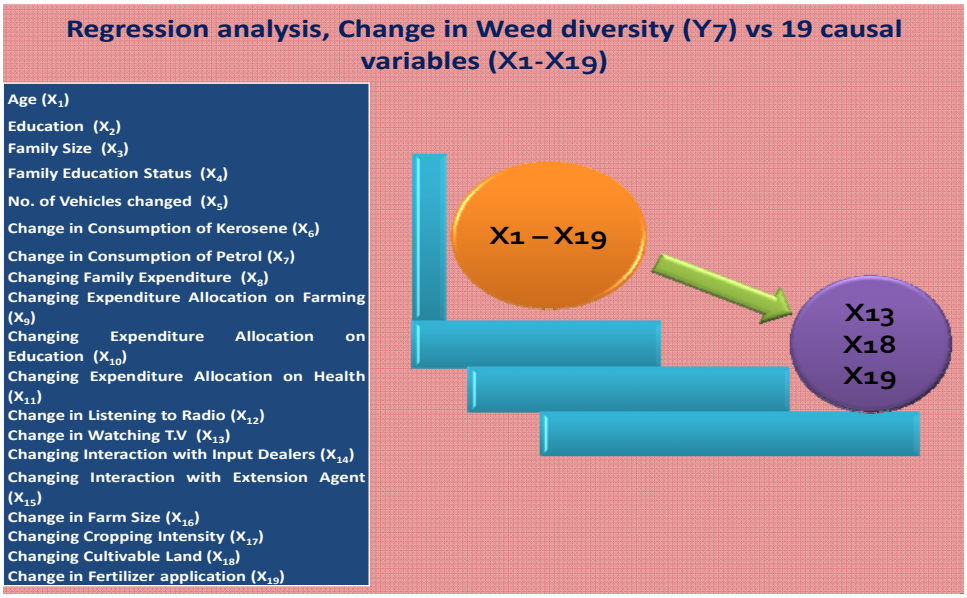


Table 43: Regression analysis: Change in Crop Disease intensity (Y_8) vs 19 causal variables (X_1-X_{19}) Multiple R sq.- 0.3328

S.L. No.	Variables	Beta	Beta x R	Reg. coef. B	S, error B	t value
1.	Age **(X_1)**	0.106	3.620	0.087	0.121	0.720
2.	Education **(X_2)**	0.108	3.851	0.213	0.279	0.561
3.	Family Size **(X_3)**	0.050	1.331	0.191	0.538	0.354
4.	Family Education Status **(X_4)**	0.185	10.628	0.658	0.730	0.902
5.	No. of Vehicles changed **(X_5)**	-0.147	6.885	-1.200	1.319	1.061
6.	Change in Consumption of Kerosene **(X_6)**	-0.142	-1.804	-0.948	1.013	0.936
7.	Change in Consumption of Petrol **(X_7)**	0.120	0.054	0.094	0.127	0.745

ISBN: 978-93-85822-01-8

8.	Changing Family Expenditure **(X_8)**	-0.243	-9.128	-0.004	0.003	1.313
9.	Changing Expenditure Allocation on Farming **(X_9)**	0.050	-1.839	0.037	0.109	0.342
10	Changing Expenditure Allocation on Education **(X_{10})**	0.130	1.986	0.127	0.153	0.835
11	Changing Expenditure Allocation on Health **(X_{11})**	-0.023	0.573	-0.034	0.175	0.192
12	Change in Listening to Radio **(X_{12})**	-0.021	-0.310	-0.005	0.030	0.164
13	Change in Watching T.V **(X_{13})**	-0.316	22.072	-0.109	0.051	2.143
14	Changing Interaction with Input Dealers **(X_{14})**	-0.359	36.301	-1.392	0.539	2.583
15	Changing Interaction with Extension Agent **(X_{15})**	0.025	-1.172	0.077	0.444	0.173
16	Change in Farm Size **(X_{16})**	0.032	1.185	0.887	4.072	0.218
17	Changing Cropping Intensity **(X_{17})**	-0.060	0.540	-0.018	0.036	0.498
18	Changing Cultivable Land **(X_{18})**	0.267	15.888	3.169	2.086	1.519
19	Change in Fertilizer Application **(X_{19})**	0.167	5.348	0.056	0.046	1.214

The table 20 presents the Regression Analysis to estimate the causal effects of 19 exogenous variables on the respective consequent variable, Change in Crop Disease intensity (Y_8).

Result: It has been found that the variable, Changing Interaction with Input Dealers (X_{14}), Change in Watching T.V (X_{13}), Changing Cultivable Land (X_{18}), have contributed respectively to the extent of 36.30%, 22.07% &

ISBN: 978-93-85822-01-8

15.89% of variance to the consequent variable, Change in Crop Disease intensity (Y_8).

Revelation: The increased interaction with input dealer is the cause of less occurrence of disease intensity. Farmers with more linkage with input dealer effectively control the disease intensity with respect to climate change by taking proper protective measurements. Watching Television, stimulates knowledge in relation to change dynamics that enables farmer to take precautions, which decreases the disease intensity. More the change in cultivable land, becomes the cause of more the occurrence of crop disease i.e. the large farmers face more the problem of crop Disease intensity than small farmers.

Therefore, these three variables, V, Change in Watching T.V & Changing Cultivable Land, can be key indicators to measure change in weed diversity. The R-sq. value is 0.3328 which implies that 33.28% of variance embedded in consequent variable, Change in Crop Disease intensity (Y_8) with the combination of 19 exogenous variables.

Step-down Regression analysis Multiple R sq. = 0.1980

Variable	Beta	t-value
Family Education Status (X_4)	0.256	2.307
Change in Watching T.V (X_{13})	-0.266	2.367
Changing Interaction with Input Dealers (X_{14})	-0.259	2.428

ISBN: 978-93-85822-01-8

Model-19

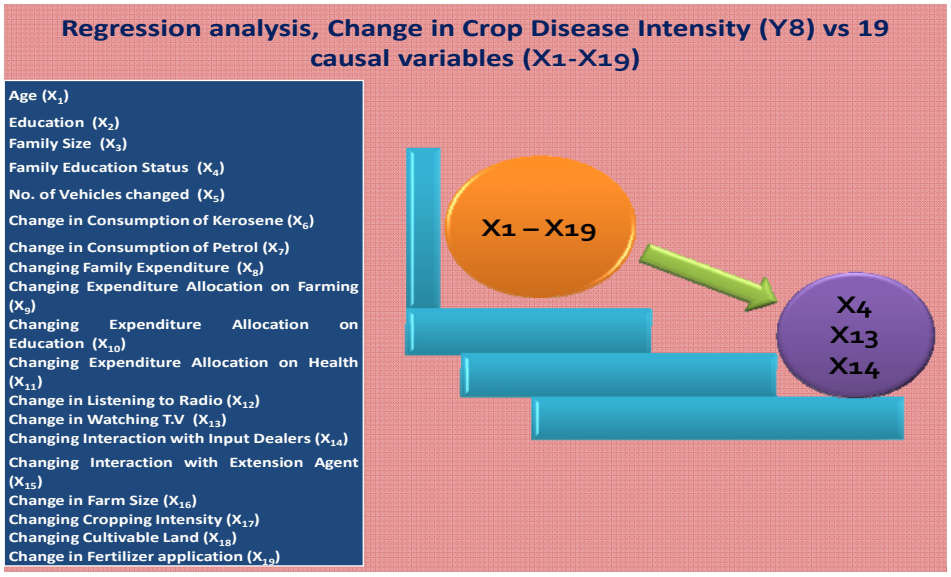


Table 44: Regression analysis: Change in Insect-pest intensity (Y_9) vs 19 causal variables (X_1-X_{19}) Multiple R sq. - 0.4119

S.L. No.	Variables	Beta	Beta x R	Reg. coef. B	S, error B	t value
1.	Age **(X_1)**	0.023	1.086	0.016	0.099	0.163
2.	Education **(X_2)**	-0.193	-0.589	-0.330	0.310	1.066
3.	Family Size **(X_3)**	-0.043	-1.950	-0.142	0.440	0.324
4.	Family Education Status **(X_4)**	0.188	4.815	0.584	0.596	0.979
5.	No. of Vehicles changed **(X_5)**	0.077	-0.024	0.632	1.077	0.587
6.	Change in Consumption of Kerosene **(X_6)**	-0.272	12.287	-1.581	0.827	1.912
7.	Change in Consumption of Petrol **(X_7)**	0.174	7.985	0.119	0.103	1.146
8.	Changing Family Expenditure **(X_8)**	0.031	0.223	0.000	0.003	0.176
9.	Changing Expenditure Allocation on Farming **(X_9)**	0.052	0.174	0.034	0.089	0.386

ISBN: 978-93-85822-01-8

10	Changing Expenditure Allocation on Education **(X_{10})**	0.132	-0.231	0.112	0.125	0.901
11	Changing Expenditure Allocation on Health **(X_{11})**	0.105	2.760	0.132	0.143	0.919
12	Change in Listening to Radio **(X_{12})**	0.003	0.021	0.001	0.025	0.025
13	Change in Watching T.V **(X_{13})**	-0.379	18.997	-0.114	0.041	2.742
14	Changing Interaction with Input Dealers **(X_{14})**	-0.056	-0.391	-0.187	0.440	0.426
15	Changing Interaction with Extension Agent **(X_{15})**	-0.186	0.142	-0.506	0.362	1.396
16	Change in Farm Size **(X_{16})**	0.073	-1.320	1.747	30.325	0.525
17	Changing Cropping Intensity **(X_{17})**	-0.219	-0.972	-0.057	0.029	1.930
18	Changing Cultivable Land **(X_{18})**	-0.113	2.016	-1.164	1.704	0.684
19	Change in Fertilizer Application **(X_{19})**	0.543	54.999	0.159	0.038	4.195

The table 21 presents the Regression Analysis to estimate the causal effects of 19 exogenous variables on the respective dependent variable, Change in Insect-pest intensity (Y_9).

Result: It has been found that the variables, Change in Fertilizer Application (X_{19}) & Change in Watching T.V (X_{13}) have contributed respectively to the extent of 55% & 18.98% of variance to the consequent variable, Change in Insect-pest intensity (Y_9).

Revelation: The increase in fertilizer application gradually reduces plant resistance to insect-pest attack tends to enhance insect-pest population and increases more need of insecticide application. With the more watching of Television, it increases sensitization on the growth of insect-pest in relation

ISBN: 978-93-85822-01-8

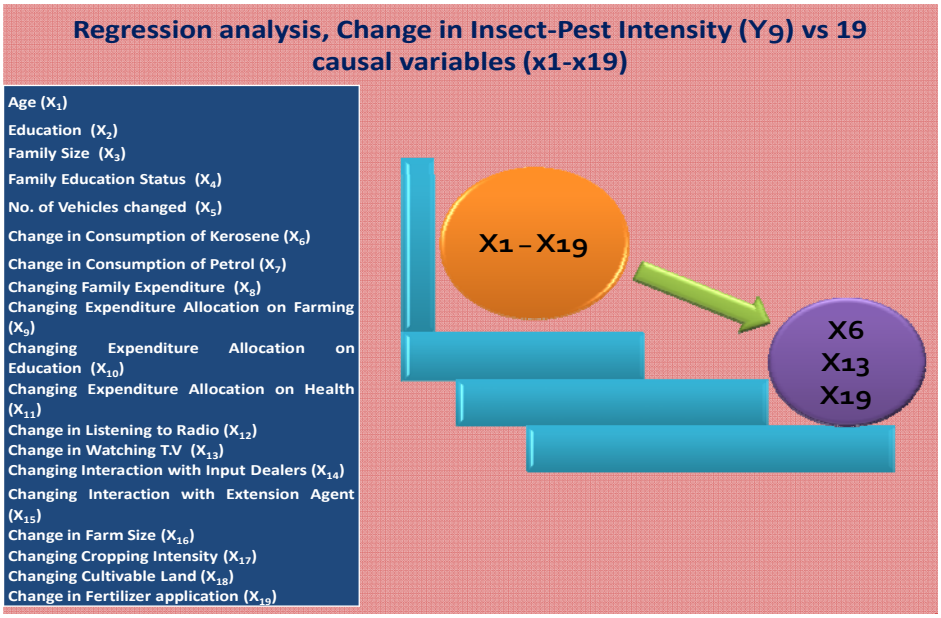
to change dynamics that enables farmer to take precautions, which decreases the insect-pest intensity.

Therefore, these two variables, Change in average fertilizer dose & Change in Watching T.V can be key indicators to measure changing insect-pest intensity. The R-sq. value is 0.4119, it is to imply that with the combination of 19 exogenous variables, 41.19% of variance embedded in consequent variable, Change in Insect-pest intensity (Y_9).

Step-down Regression analysis **Multiple R sq. = 0.2663**

Variable	Beta	t-value
Consumption of Kerosene (X_6)	-0.237	2.143
Watching T.V (X_{13})	-0.316	2.920
Change in average fertilizer dose (X_{19})	0.377	3.743

Model-20



ISBN: 978-93-85822-01-8

Table 45: Regression analysis: Perceived Climate change effect (Y_{10}) vs 19 causal variables (X_1-X_{19}) Multiple R sq. - 0.1844

S.L. No.	Variables	Beta	Beta x R	Reg. coef. B	S, error B	t value
	Age (X_1)	-0.110	7.196	-0.084	0.124	0.676
	Education (X_2)	-0.161	-8.702	-0.294	0.389	0.755
	Family Size (X_3)	0.031	1.106	0.111	0.553	0.200
	Family Education Status (X_4)	0.126	9.019	0.416	0.750	0.555
	No. of Vehicles changed (X_5)	0.130	10.752	1.144	1.354	0.845
	Change in Consumption of Kerosene (X_6)	-0.008	0.259	-0.053	1.040	0.051
	Change in Consumption of Petrol (X_7)	-0.017	-0.837	-0.012	0.130	0.093
	Changing Family Expenditure (X_8)	0.126	14.068	0.002	0.003	0.617
	Changing Expenditure Allocation on Farming (X_9)	-0.148	14.555	-0.103	0.112	0.922
	Changing Expenditure Allocation on Education (X_{10})	0.018	2.131	0.016	0.157	0.102
	Changing Expenditure Allocation on Health (X_{11})	0.144	12.254	0.193	0.180	1.075
	Change in Listening to Radio (X_{12})	0.105	3.750	0.023	0.031	0.749
	Change in Watching T.V (X_{13})	-0.115	0.716	-0.037	0.052	0.703
	Changing Interaction with Input Dealers (X_{14})	0.098	3.825	0.351	0.553	0.635
	Changing Interaction with Extension Agent (X_{15})	-0.008	-0.201	-0.024	0.456	0.052
	Change in Farm Size (X_{16})	-0.081	-3.719	-2.064	4.182	0.494

ISBN: 978-93-85822-01-8

	Changing Cropping Intensity (X_{17})	-0.040	-0.518	-0.011	0.037	0.301
	Changing Cultivable Land (X_{18})	0.230	32.517	2.528	2.143	1.180
	Change in Fertilizer Application (X_{19})	0.095	1.828	0.030	0.048	0.626

The table 22 presents the Regression Analysis to estimate the causal effects of 19 exogenous variables on the respective dependent variable, Perceived Climate change effect (Y_{10}).

Result: It has been found that the variable, Changing Cultivable Land (X_{18}), has contributed 32.52% variance to the consequent variable, Perceived Climate change effect (Y_{10}).

Revelation: Large farmers face more the brunt of climate change. Farmers who are investing more, are getting affected largely by the effect of climate change.

So, changing cultivable land can be key indicator to measure Climate change effect .The R-sq. value is 0.1844, it is to imply that with the combination of 19 exogenous variables, 18.44% of variance embedded in consequent variable, Perceived Climate change effect (Y_{10}).

Step-down Regression analysis Multiple R sq. = 0.0682

Variable	Beta	t-value
Cultivable Land (X_{18})	0.261	2.390

ISBN: 978-93-85822-01-8

Model-21

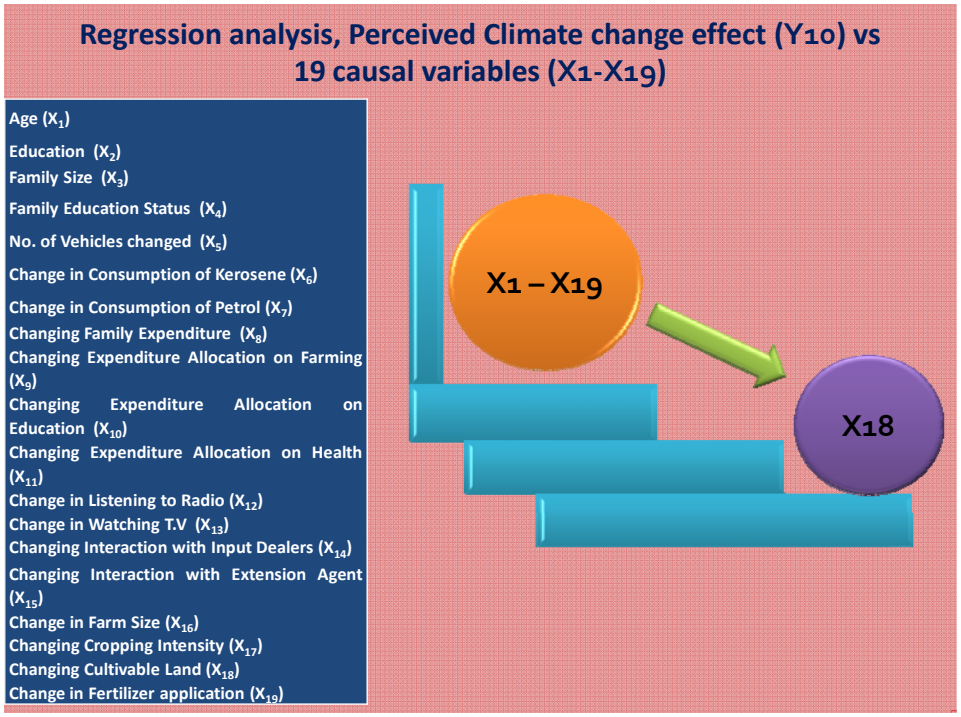


Table 46: Regression analysis: Perceived Climate change effect on Agriculture (Y_{11}) vs 19 causal variables (X_1-X_{19}) Multiple R sq. - 0.2467

S.L. No.	Variables	Beta	Beta x R	Reg. coef. B	S, error B	t value
1.	Age **(X_1)**	-0.391	49.051	-0.349	0.139	2.505
2.	Education **(X_2)**	-0.337	-6.763	-0.720	0.436	1.651
3.	Family Size **(X_3)**	-0.003	0.013	-0.014	0.620	0.022
4.	Family Education Status **(X_4)**	0.137	6.547	0.528	0.840	0.629
5.	No. of Vehicles changed **(X_5)**	0.069	4.113	0.709	1.518	0.467
6.	Change in Consumption of Kerosene **(X_6)**	-0.057	2.217	-0.414	1.166	0.355

ISBN: 978-93-85822-01-8

7.	Change in Consumption of Petrol **(X_7)**	0.133	6.970	0.113	0.146	0.775
8.	Changing Family Expenditure **(X_8)**	0.075	3.991	0.001	0.004	0.382
9.	Changing Expenditure Allocation on Farming **(X_9)**	0.057	-2.889	0.046	0.125	0.371
10	Changing Expenditure Allocation on Education **(X_{10})**	0.268	33.499	0.285	0.176	1.624
11	Changing Expenditure Allocation on Health **(X_{11})**	0.047	2.118	0.074	0.202	0.368
12	Change in Listening to Radio **(X_{12})**	-0.041	0.918	-0.011	0.035	0.302
13	Change in Watching T.V **(X_{13})**	-0.195	-5.170	-0.073	0.058	1.242
14	Changing Interaction with Input Dealers **(X_{14})**	0.137	5.596	0.576	0.620	0.929
15	Changing Interaction with Extension Agent **(X_{15})**	-0.098	-0.821	-0.333	0.511	0.651
16	Change in Farm Size **(X_{16})**	0.031	1.517	0.918	4.687	0.196
17	Changing Cropping Intensity **(X_{17})**	-0.139	2.809	-0.045	0.041	1.083
18	Changing Cultivable Land **(X_{18})**	-0.028	-1.603	-0.364	2.402	0.152
19	Change in Fertilizer Application **(X_{19})**	0.106	-2.112	0.038	0.053	0.720

The table 23 presents the Regression Analysis to estimate the causal effects of 19 exogenous variables on the respective dependent variable, Perceived Climate change effect on Agriculture (Y_{11}).

ISBN: 978-93-85822-01-8

Result: It has been found that the variables, Age (X_1) & Changing Expenditure Allocation on Education (X_{10}) have contributed respectively 49.05% & 33.50% variance to the consequent variable, Perceived Climate change effect on Agriculture (Y_{11}).

Revelation: Climate change largely affects to agriculture due to its dependency on natural resources. Climate change is a crucial factor in the development of agriculture. Old age farmers can't realize about the effect of climate change on agriculture, whereas perceived climate change effect is more in young farmers. Higher expenditure on education i.e. more the education, more they know about climate change. Young educated farmers are more aware of climate change and they have adequate perception on effect on agriculture than old age farmers.

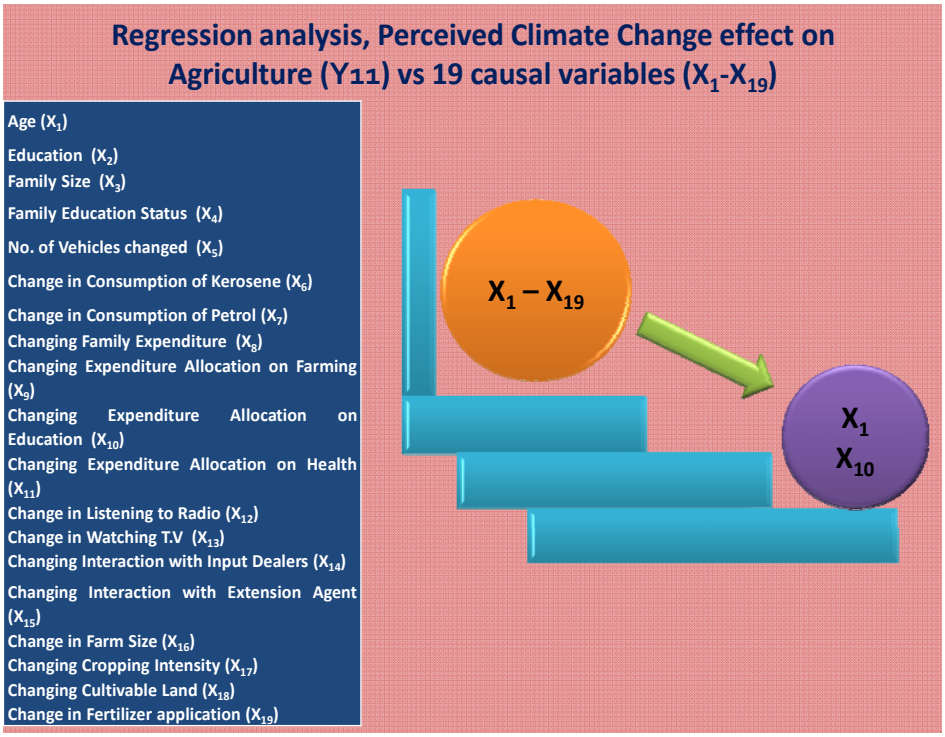
So, Age & Changing Expenditure Allocation on Education can be key indicators to measure perceived Climate change effect on Agriculture. The R-sq. value is 0.2467, it is to imply that, 24.67% of variance embedded in consequent variable, Perceived Climate change effect on Agriculture (Y_{11}) with the combination of 19 exogenous variables.

Step-down Regression analysis Multiple R sq.= 0.1451

Variable	Beta	t-value
Age (X1)	-0.236	2.125
Changing Expenditure Allocation on Education (X_{10})	0.234	2.108

ISBN: 978-93-85822-01-8

Model-22



8.3 PATH ANALYSIS

Table 47: Path Analysis: Direct, Indirect and Residual effect; Change in Perceived Effect of Radio (Y_1) Vs 19 Exogenous Variables (X_1-X_{19})

Residual effect= 0.3228

Variables	Total Effect (r)	Direct Effect (DE)	Indirect Effect (IE)=r-DE	Highest Indirect Effect
Age **(X_1)**	0.0732	0.0976	-0.0244	0.0795(X_{13})
Education **(X_2)**	-0.1978	0.0614	-0.2592	-0.1036(X_4)
Family Size **(X_3)**	-0.1182	-0.0644	-0.0538	0.0646(X_6)
Family Education Status **(X_4)**	-0.3099	-0.1330	-0.1769	-0.1050(X_7)
No. of Vehicles changed **(X_5)**	-0.2280	-0.0610	-0.1670	-0.1356(X_{12})

ISBN: 978-93-85822-01-8

Change in Consumption of Kerosene **(X_6)**	0.3047	-0.1825	0.4872	0.2685(X_{12})
Change in Consumption of Petrol **(X_7)**	-0.3584	-0.1761	-0.1823	-0.1606(X_{12})
Changing Family Expenditure **(X_8)**	-0.2227	0.0372	-0.2599	-0.1363(X_{12})
Changing Expenditure Allocation on Farming **(X_9)**	-0.0797	-0.1111	0.0314	-0.0651(X_{10})
Changing Expenditure Allocation on Education **(X_{10})**	-0.0673	0.1151	-0.1824	-0.0779(X_{13})
Changing Expenditure Allocation on Health **(X_{11})**	0.0195	-0.0723	0.0918	0.0185(X_{14})
Change in Listening to Radio **(X_{12})**	0.7292	0.6739	0.0553	0.1101(X_{13})
Change in Watching T.V **(X_{13})**	-0.5035	-0.2657	-0.2378	-0.2792(X_{12})
Changing Interaction with Input Dealers **(X_{14})**	-0.0480	0.0850	-0.1330	-0.0739(X_{12})
Changing Interaction with Extension Agent **(X_{15})**	-0.0835	0.1044	-0.1879	-0.0840(X_{13})
Change in Farm Size **(X_{16})**	-0.0761	-0.1008	0.0247	-0.0307(X_6)
Changing Cropping Intensity **(X_{17})**	0.0069	-0.1073	0.1142	0.0696(X_{12})
Changing Cultivable Land **(X_{18})**	-0.1371	0.0050	-0.1421	-0.0579(X_{16})
Change in Fertilizer Application **(X_{19})**	-0.0164	-0.1214	0.1050	0.0419(X_{12})

Table 24, explains the Path Analysis to depict the Total Direct Effect, Total Indirect Effect and Residual Effect of 19 exogenous variables on the consequent variable, Change in Perceived Effect of Radio (Y_1).

ISBN: 978-93-85822-01-8

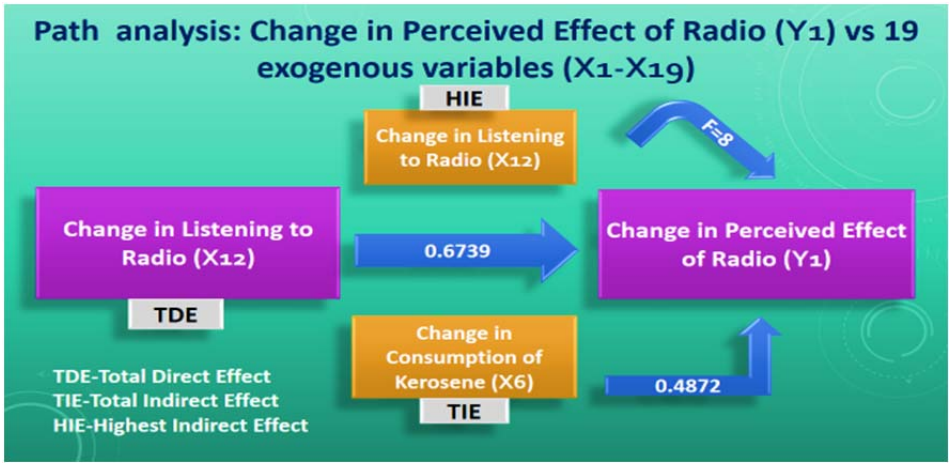
It has been found that the variable, Change in Listening to Radio (X_{12}), has exerted the highest Direct Effect while Change in Consumption of Kerosene (X_6), has exerted the Highest Indirect Effect.

So, considering these, it can be concluded that the traditional rural people, who are consuming more kerosene to present themselves to traditional diaspora, they are mostly getting impacted by radio.

The variable, Change in Listening to Radio (X_{12}), has routed the Highest Indirect Effect of 8 exogenous variables to characterise the consequent variable. So, this variable has got tremendous companionship behaviour to characterize the consequent variable, Change in Perceived Effect of Radio (Y_1).

The residual effect is 0.3228, it is to conclude that even with the combination of 19 exogenous variables, 32.28% of variance embedded with consequent variable, Change in Perceived Effect of Radio (Y_1), couldn't be expressed.

Model-23



ISBN: 978-93-85822-01-8

Table 48: Path Analysis: Direct, Indirect and Residual effect; Change in Perceived Effect of T.V. (Y_2) Vs 19 Exogenous Variables (X_1-X_{19})
Residual effect= 0.3090

Variables	Total Effect (r)	Direct Effect (DE)	Indirect Effect (IE)=r-DE	Highest Indirect Effect
Age **(X_1)**	-0.3076	-0.1556	-0.1520	-0.1820(X13)
Education **(X_2)**	0.3033	0.0620	0.2413	0.1813(X13)
Family Size **(X_3)**	0.0082	-0.0028	0.0110	-0.0411(X1)
Family Education Status **(X_4)**	0.3023	-0.0693	0.3716	0.2033(X13)
No. of Vehicles changed **(X_5)**	0.2818	-0.0284	0.3102	0.2038(X13)
Change in Consumption of Kerosene **(X_6)**	-0.4136	-0.0109	-0.4027	-0.2515(X13)
Change in Consumption of Petrol **(X_7)**	0.3356	0.0629	0.2727	0.1978(X13)
Changing Family Expenditure **(X_8)**	0.2386	0.1045	0.1341	0.1228(X13)
Changing Expenditure Allocation on Farming **(X_9)**	0.0106	0.0955	-0.0849	-0.0431(X13)
Changing Expenditure Allocation on Education **(X_{10})**	0.2257	-0.0230	0.2487	0.1782(X13)
Changing Expenditure Allocation on Health **(X_{11})**	0.1043	0.1358	-0.0315	0.1358(X11)
Change in Listening to Radio **(X_{12})**	-0.4686	-0.2012	-0.2674	-0.2520(X13)
Change in Watching T.V **(X_{13})**	0.7681	0.6081	0.1600	0.6081(X13)
Changing Interaction with Input Dealers **(X_{14})**	0.2572	0.0290	0.2282	0.1215(X13)
Changing Interaction with Extension Agent **(X_{15})**	0.3481	0.0596	0.2885	0.1922(X13)
Change in Farm Size **(X_{16})**	0.0758	0.0899	-0.0141	0.0899(X16)

ISBN: 978-93-85822-01-8

Changing Cropping Intensity **(X_{17})**	0.0039	0.0396	-0.0357	0.0396(X17)
Changing Cultivable Land **(X_{18})**	0.0976	-0.0789	0.1765	-0.0789(X18)
Change in Fertilizer Application **(X_{19})**	0.0655	0.0601	0.0054	0.0601(X19)

Table 25 explains the Path Analysis to depict the Total Direct Effect, Total Indirect Effect and Residual Effect of 19 exogenous variables on the consequent variable, Change in Perceived Effect of T.V. (Y_2).

It has been found that the variable, Change in Watching T.V (X_{13}), has exerted the highest Direct Effect while Change in Consumption of Kerosene (X_6), has exerted the Highest Indirect Effect. So, considering these, it can be concluded that the apparently modern people, who are consuming less kerosene and watching Television more, are getting mostly impacted by Television.

The variable, Change in Watching Television (X_{13}), has routed the Highest Indirect Effect of 13 exogenous variables to characterise the consequent variable. So, this variable has got tremendous companionship behaviour to characterize the consequent variable, Change in Perceived Effect of T.V. (Y_2).

The residual effect is 0.3090, it is to conclude that even with the combination of 19 exogenous variables, 30.90% of variance embedded with consequent variable, Change in Perceived Effect of T.V. (Y_2), couldn't be expressed.

ISBN: 978-93-85822-01-8

Model-24

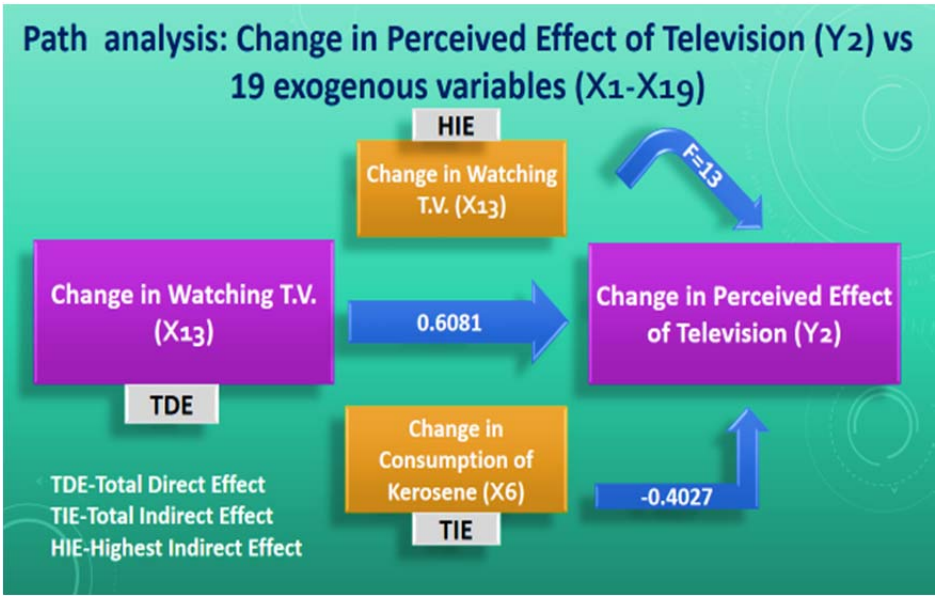


Table 49: Path Analysis: Direct, Indirect and Residual effect; Change in Perceived Effect of Input dealer (Y_3) Vs 19 Exogenous Variables (X_1-X_{19})

Residual effect= 0.4645

Variables	Total Effect (r)	Direct Effect (DE)	Indirect Effect (IE)=r-DE	Highest Indirect Effect
Age **(X_1)**	0.0580	-0.0571	0.1151	0.0897(X2)
Education **(X_2)**	-0.1161	-0.2232	0.1071	0.1002(X4)
Family Size **(X_3)**	0.2609	0.1175	0.1434	0.2162(X14)
Family Education Status **(X_4)**	-0.1418	0.1286	-0.2704	-0.1739(X2)
No. of Vehicles changed **(X_5)**	0.0591	0.0447	0.0144	0.1390(X14)
Change in Consumption of Kerosene **(X_6)**	-0.1450	0.0279	-0.1729	-0.2259(X14)
Change in Consumption of Petrol **(X_7)**	-0.0315	-0.0755	0.0440	-0.0992(X2)

ISBN: 978-93-85822-01-8

Changing Family Expenditure **(X_8)**	-0.2231	-0.0260	-0.1971	-0.1145(X2)
Changing Expenditure Allocation on Farming **(X_9)**	-0.0292	-0.3157	0.2865	0.1513(X14)
Changing Expenditure Allocation on Education **(X_{10})**	-0.0524	-0.1969	0.1445	0.1786(X9)
Changing Expenditure Allocation on Health **(X_{11})**	0.2683	0.1607	0.1076	0.1489(X14)
Change in Listening to Radio **(X_{12})**	-0.0951	-0.1261	0.0310	-0.0750(X14)
Change in Watching T.V **(X_{13})**	-0.0391	-0.1113	0.0722	0.1367(X14)
Changing Interaction with Input Dealers **(X_{14})**	0.6009	0.6841	-0.0832	-0.0698(X9)
Changing Interaction with Extension Agent **(X_{15})**	0.1112	-0.1063	0.2175	0.3074(X14)
Change in Farm Size **(X_{16})**	-0.2061	-0.0780	-0.1281	-0.1437(X14)
Changing Cropping Intensity **(X_{17})**	0.0619	-0.0535	0.1154	0.0989(X14)
Changing Cultivable Land **(X_{18})**	-0.1879	-0.0457	-0.1422	-0.0830(X14)
Change in Fertilizer Application **(X_{19})**	0.0692	-0.0851	0.1543	0.1980(X14)

Table 26 explains the Path Analysis to depict the Total Direct Effect, Total Indirect Effect and Residual Effect of 19 exogenous variables on the consequent variable, Change in Perceived Effect of Input dealer (Y_3).

It has been found that the variable, Changing Interaction with Input Dealers (X_{14}), has exerted the highest Direct Effect while Changing Expenditure Allocation on Farming (X_9), has exerted the Highest Indirect Effect. More the Changes in interaction with input dealer, more the perceived effects of input dealer in relation to change dynamics. More expenditure allocation on farming makes farmer more protective towards his outcome that makes him

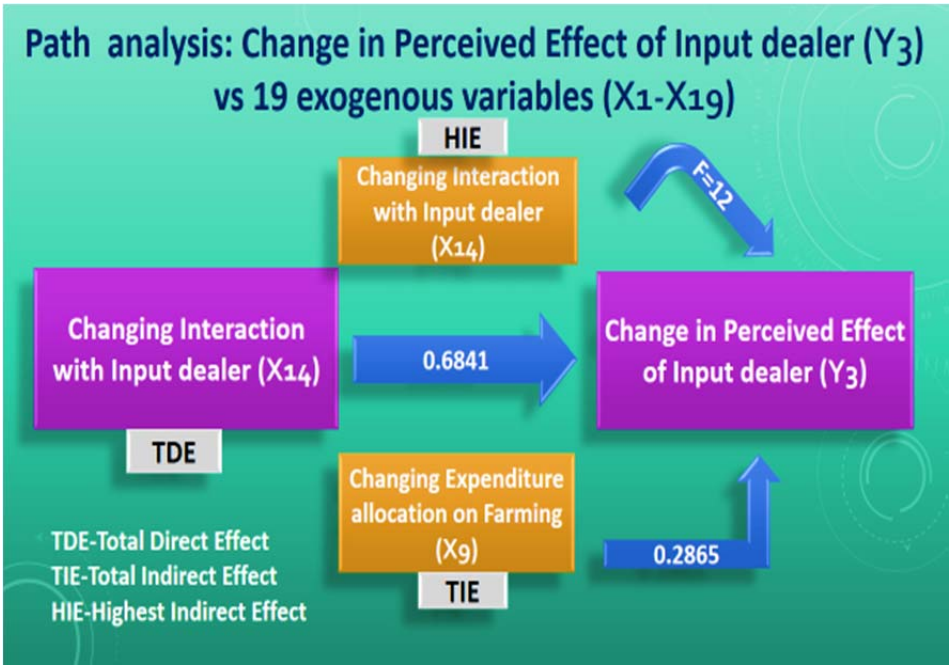
ISBN: 978-93-85822-01-8

getting indirectly affected by the effect of input dealer for better management & better production.

The variable, Changing Interaction with Input Dealers (X_{14}), has routed the Highest Indirect Effect of 12 exogenous variables to characterise the consequent variable, Change in Perceived Effect of Input dealer (Y_3).

The residual effect is 0.4645, it is to conclude that even with the combination of 19 exogenous variables, 46.45% of variance embedded with consequent variable, Change in Perceived Effect Input dealer (Y_3), couldn't be expressed.

Model-25



ISBN: 978-93-85822-01-8

Table 50: Path Analysis: Direct, Indirect and Residual effect; Change in Perceived Effect of Extension agent (Y_4) Vs 19 Exogenous Variables Residual effect=0.5155

Variables	Total Effect (r)	Direct Effect (DE)	Indirect Effect (IE)=r-DE	Highest Indirect Effect
Age **(X_1)**	0.0042	0.0044	-0.0002	-0.1044(X13)
Education **(X_2)**	0.0263	-0.0177	0.0440	0.1040(X13)
Family Size **(X_3)**	0.1079	0.0682	0.0397	0.1162(X19)
Family Education Status **(X_4)**	0.0284	0.0257	0.0027	0.1166(X13)
No. of Vehicles changed **(X_5)**	0.1265	0.0512	0.0753	0.1169(X13)
Change in Consumption of Kerosene **(X_6)**	-0.1505	0.0986	-0.2491	-0.1442(X13)
Change in Consumption of Petrol **(X_7)**	0.0318	-0.0871	0.1189	0.1134(X13)
Changing Family Expenditure **(X_8)**	-0.0367	-0.0491	0.0124	0.0866(X18)
Changing Expenditure Allocation on Farming **(X_9)**	0.0343	-0.0879	0.1222	0.0842(X10)
Changing Expenditure Allocation on Education **(X_{10})**	-0.0154	-0.1489	0.1335	0.1022(X13)
Changing Expenditure Allocation on Health **(X_{11})**	-0.0186	0.0598	-0.0784	-0.0350(X10)
Change in Listening to Radio **(X_{12})**	0.0122	0.1264	-0.1142	-0.1445(X13)

ISBN: 978-93-85822-01-8

Change in Watching T.V **(X_{13})**	0.3183	0.3488	-0.0305	0.1085(X15)
Changing Interaction with Input Dealers **(X_{14})**	0.1735	-0.1185	0.2920	0.1543(X15)
Changing Interaction with Extension Agent **(X_{15})**	0.5060	0.3433	0.1627	0.1102(X13)
Change in Farm Size **(X_{16})**	-0.0142	-0.0169	0.0027	0.0939(X18)
Changing Cropping Intensity **(X_{17})**	0.0160	-0.1066	0.1226	0.1389(X19)
Changing Cultivable Land **(X_{18})**	0.0664	0.1635	-0.0971	-0.0722(X19)
Change in Fertilizer Application **(X_{19})**	0.4944	0.4308	0.0636	0.1343(X15)

Table 27 explains the Path Analysis to depict the Total Direct Effect, Total Indirect Effect and Residual Effect of 19 exogenous variables on the consequent variable, Change in Perceived Effect of Extension agent (Y_4).

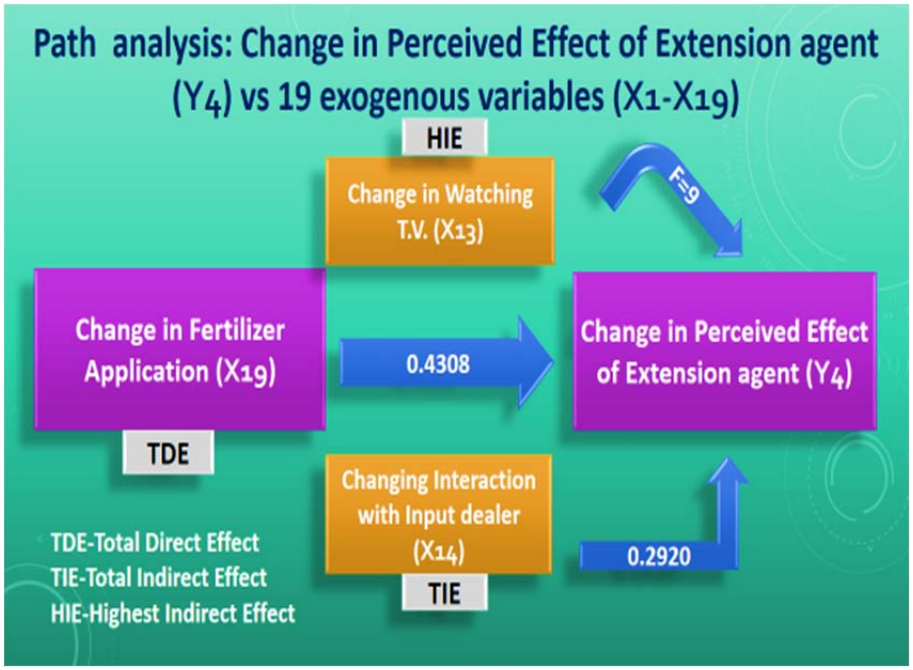
Variable, Change in Fertilizer Application (X_{19}), has exerted the highest Direct Effect while Changing Interaction with Input Dealers (X_{14}), has exerted the Highest Indirect Effect. With change in fertilizer use, the change in perceived effect of extension agent with respect to change pattern, changes. Change in interaction with input dealer has the highest indirect effect on changing effect of extension agent. Aware and risk taking farmers are applying more fertilizer to increase their production ad they have better link with extension agent for effective farming. So, cosmopolite people are getting largely impacted by the effect of extension agent on the perception on change dynamics.

ISBN: 978-93-85822-01-8

The variable, Change in Watching T.V (X_{13}), finds maximum no. of indirect effect i.e. 9 times on the resultant variable, Change in Perceived Effect of Extension agent (Y_4).

The residual effect is 0.5155, it is to conclude that even with the combination of 19 exogenous variables, 51.55% of variance embedded with consequent variable, Change in Perceived Effect Extension agent (Y_4), couldn't be expressed.

Model-26



ISBN: 978-93-85822-01-8

Table 51: Path Analysis: Direct, Indirect and Residual effect; Change in Productivity (Y_5) Vs 19 Exogenous Variables (X_1-X_{19})

Residual effect= 0.2668

Variables	Total Effect (r)	Direct Effect (DE)	Indirect Effect (IE)=r-DE	Highest Indirect Effect
Age **(X_1)**	0.2587	0.0911	0.1676	0.1532(X19)
Education **(X_2)**	0.0212	0.0521	-0.0309	-0.0583(X10)
Family Size **(X_3)**	0.2961	0.0749	0.2212	0.1892(X19)
Family Education Status **(X_4)**	-0.0043	0.0341	-0.0384	-0.0780(X10)
No. of Vehicles changed **(X_5)**	-0.1475	-0.1813	0.0338	0.0755(X6)
Change in Consumption of Kerosene **(X_6)**	-0.2268	-0.1638	-0.0630	-0.1477(X19)
Change in Consumption of Petrol **(X_7)**	-0.0046	-0.1199	0.1153	0.0597(X6)
Changing Family Expenditure **(X_8)**	-0.1563	-0.0058	-0.1505	-0.1100(X19)
Changing Expenditure Allocation on Farming **(X_9)**	0.0484	-0.0906	0.1390	0.1411(X10)
Changing Expenditure Allocation on Education **(X_{10})**	-0.2165	-0.2495	0.0330	0.05132(X9)
Changing Expenditure Allocation on Health **(X_{11})**	-0.0737	0.0017	-0.0754	-0.0587(X10)
Change in Listening to Radio **(X_{12})**	0.1079	0.1210	-0.0131	-0.0653(X6)
Change in Watching T.V **(X_{13})**	-0.0015	0.1270	-0.1285	-0.0731(X10)
Changing Interaction with Input Dealers **(X_{14})**	0.2104	0.0032	0.2072	0.2031(X19)
Changing Interaction with Extension Agent **(X_{15})**	0.2475	-0.0432	0.2907	0.2745(X19)

ISBN: 978-93-85822-01-8

Change in Farm Size **(X_{16})**	-0.2110	-0.0532	-0.1578	-0.1495(X19)
Changing Cropping Intensity **(X_{17})**	0.2975	0.0633	0.2342	0.2263(X19)
Changing Cultivable Land **(X_{18})**	-0.1339	0.1463	-0.2802	-0.1175(X18)
Change in Fertilizer Application **(X_{19})**	0.7959	0.7016	0.0943	0.0345(X6)

Table 28 explains the Path Analysis to depict the Total Direct Effect, Total Indirect Effect and Residual Effect of 19 exogenous variables on the consequent variable, Change in Productivity (Y_5).

The table elucidates that variable, Change in Fertilizer Application (X_{19}), has exerted the highest Direct Effect, whereas Changing Interaction with Extension agent (X_{15}), has exerted the Highest Indirect Effect on consequent variable. Increase in fertilizer application, increases the productivity level. So, it has got a direct effect on productivity. More interaction with extension agent makes the farmers capable of acquiring new information and modern technologies, by the help of which more productivity can be attained.

The variable, Change in average fertilizer dose (X_{19}), finds maximum no. of indirect effect i.e. 8 times on the resultant variable, Change in Productivity (Y_5).

The residual effect is 0.2668, it is to conclude that even with the combination of 19 exogenous variables, 26.88% of variance embedded with consequent variable, Change in Productivity (Y_5), couldn't be expressed.

ISBN: 978-93-85822-01-8

Model-27

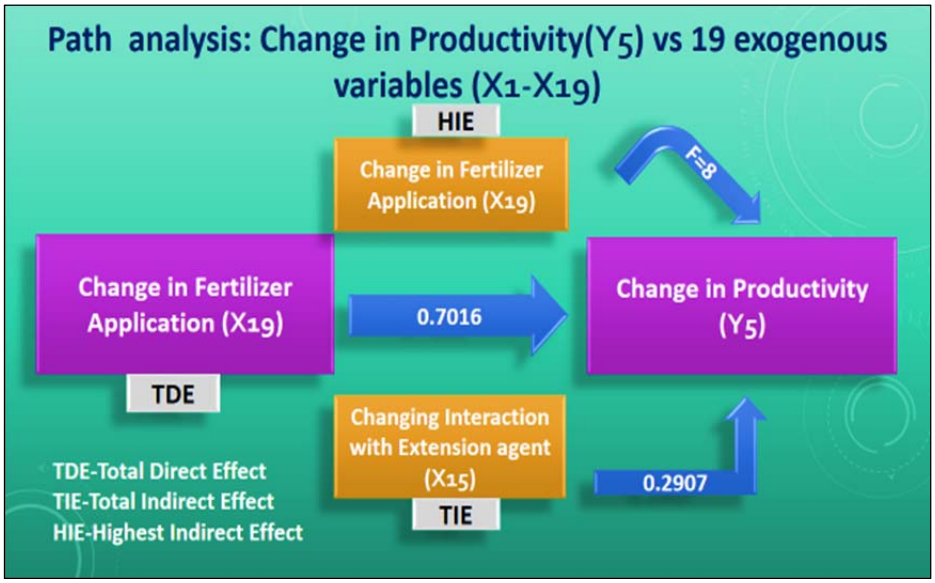


Table 52: Path Analysis: Direct, Indirect and Residual effect; Change in Family income (Y_6) Vs 19 Exogenous Variables (X_1-X_{19})

Residual effect= 0.1727

Variables	Total Effect (r)	Direct Effect (DE)	Indirect Effect (IE)=r-DE	Highest Indirect Effect
Age **(X_1)**	-0.1347	-0.0189	-0.1158	-0.1093(X8)
Education **(X_2)**	0.5083	0.0737	0.4346	0.4723(X8)
Family Size **(X_3)**	-0.1377	0.0396	-0.1773	-0.0676(X8)
Family Education Status **(X_4)**	0.5425	0.0627	0.4798	0.5409(X8)
No. of Vehicles changed **(X_5)**	-0.0731	-0.1126	0.0395	0.0822(X8)
Change in Consumption of Kerosene **(X_6)**	0.0851	0.0535	0.0316	-0.0833(X8)
Change in Consumption of Petrol **(X_7)**	0.3569	-0.1628	0.5197	0.4902(X8)
Changing Family Expenditure **(X_8)**	0.8718	0.9203	-0.0485	-0.0867(X7)

ISBN: 978-93-85822-01-8

Changing Expenditure Allocation on Farming **(X_9)**	-0.2351	0.0139	-0.2490	-0.1932(X8)
Changing Expenditure Allocation on Education **(X_{10})**	0.2889	-0.0056	0.2945	0.3072(X8)
Changing Expenditure Allocation on Health **(X_{11})**	0.0296	0.0467	-0.0171	-0.012(X17)
Change in Listening to Radio **(X_{12})**	-0.0732	0.0550	-0.1282	-0.1861(X8)
Change in Watching T.V **(X_{13})**	0.0983	0.0116	0.0867	0.1858(X8)
Changing Interaction with Input Dealers **(X_{14})**	-0.1882	0.0213	-0.2095	-0.1358(X8)
Changing Interaction with Extension Agent **(X_{15})**	-0.1012	-0.0343	-0.0669	-0.0228(X7)
Change in Farm Size **(X_{16})**	0.2133	0.0023	0.2110	0.1848(X8)
Changing Cropping Intensity **(X_{17})**	-0.2157	-0.0913	-0.1244	-0.1280(X8)
Changing Cultivable Land **(X_{18})**	0.4225	-0.0400	0.4625	0.4874(X8)
Change in Fertilizer Application **(X_{19})**	-0.2011	-0.0268	-0.1743	-0.1443(X8)

Table 29 explains the Path Analysis to depict the Total Direct Effect, Total Indirect Effect and Residual Effect of 19 exogenous variables on the consequent variable, Change in Family income (Y_6).

The table has elucidated that, variable, Change in Consumption of Petrol (X_7) has recorded the Highest Direct Effect while variable, and Changing Family Expenditure (X_8) has recorded Highest Indirect Effect on the consequent variable, Change in Family income (Y_6).

Increase in family expenditure on education, health, farming etc., increases family income through better service, better health, better production etc. More expenditure in farming enables farmers to adopt modern agriculture. More consumption of petrol refers to more mechanized farming, more

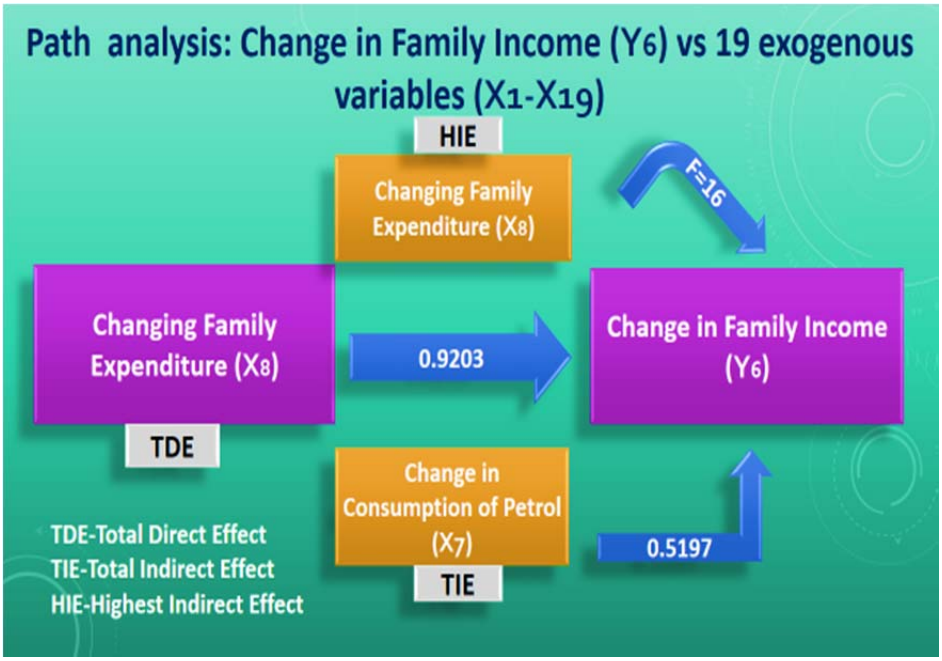
ISBN: 978-93-85822-01-8

market linkage and more cosmopolite nature, which are in a conglomeration, indirectly helps to increase the income level and farmers' standard of living with respect to change dynamics.

The variable, Changing Family Expenditure (X8), has routed the Highest Indirect Effect of 16 exogenous variables to characterise the consequent variable, Change in Family income (Y_6). So, variable, Changing Family Expenditure is a crucial factor to determine the family income.

The Residual Effect being 0.1727, it is to infer that 17.27% portion of variance embedded in the consequent variable, Change in Family income (Y_6), could not be explained.

Model-28



ISBN: 978-93-85822-01-8

Table 53: Path Analysis: Direct, Indirect and Residual effect; Change in Weed diversity (Y_7) Vs 19 Exogenous Variables (X_1-X_{19})
Residual effect- 0.6028

Variables	Total Effect (r)	Direct Effect (DE)	Indirect Effect (IE)=r-DE	Highest Indirect Effect
Age **(X_1)**	-0.0034	0.0136	-0.0170	0.1197(X13)
Education **(X_2)**	0.0631	0.0086	0.0545	0.1561(X4)
Family Size **(X_3)**	-0.0256	-0.0369	0.0113	-0.0576(X19)
Family Education Status **(X_4)**	0.1273	0.2004	-0.0731	-0.1337(X13)
No. of Vehicles changed **(X_5)**	0.0707	0.0588	0.0119	-0.1340(X13)
Change in Consumption of Kerosene **(X_6)**	0.1337	0.0374	0.0963	0.1654 (X13)
Change in Consumption of Petrol **(X_7)**	0.0843	0.1598	-0.0755	-0.1301(X13)
Changing Family Expenditure **(X_8)**	0.2097	-0.2193	0.4290	0.2450(X18)
Changing Expenditure Allocation on Farming **(X_9)**	-0.0087	0.1241	-0.1328	-0.0671(X18)
Changing Expenditure Allocation on Education **(X_{10})**	0.0570	0.0702	-0.0132	0.1425(X18)
Changing Expenditure Allocation on Health **(X_{11})**	0.0100	0.0618	-0.0518	-0.0433(X18)
Change in Listening to Radio **(X_{12})**	-0.0157	-0.0938	0.0781	0.1657(X13)
Change in Watching T.V **(X_{13})**	-0.2747	-0.4000	0.1253	0.0670(X4)
Changing Interaction with Input Dealers **(X_{14})**	-0.2791	-0.1540	-0.1251	-0.0799(X13)
Changing Interaction with Extension Agent **(X_{15})**	-0.2526	-0.0330	-0.2196	-0.1264(X13)

ISBN: 978-93-85822-01-8

Change in Farm Size **(X_{16})**	0.1844	-0.1019	0.2863	0.2656(X18)
Changing Cropping Intensity **(X_{17})**	-0.1319	-0.0208	-0.1111	-0.0689(X19)
Changing Cultivable Land **(X_{18})**	0.3761	0.4626	-0.0865	-0.1161(X8)
Change in Fertilizer Application **(X_{19})**	-0.3253	-0.2136	-0.1117	-0.0775(X18)

Table 30 shows the Path Analysis to depict the Total Direct Effect, Total Indirect Effect and Residual Effect of 19 exogenous variables on the consequent variable, Change in Weed diversity (Y_7).

From the table, variable, Changing Cultivable Land (X_{18}), has recorded the Highest Direct Effect while variable, Changing Family Expenditure (X_8), has recorded Highest Indirect Effect on the consequent variable, Change in Weed diversity (Y_7).

Change in cultivable land, has a direct effect on change in weed diversity, as more the cultivable land, more the farmer suffers from the effect of weed diversity. Large farmers are getting more affected in compare to small farmers by the effect of weed diversity due to bigger possession. Higher family expenditure leads to more investing in controlling weed diversity which minimises the weed infestation.

The variable, Change in Watching T.V (X_{13}), has routed the Highest Indirect Effect of 8 exogenous variables to characterise the consequent variable, Change in Weed diversity (Y_7). More watching Television leads to acquiring more knowledge to control the weed infestation, which ultimately helps in decreasing weed diversity.

ISBN: 978-93-85822-01-8

The Residual Effect being 0.6028, it is to infer that a huge portion of variance (60.28%) in the consequent variable could not be explained. So, it would be more effective if more numbers of variable are included.

Model-29

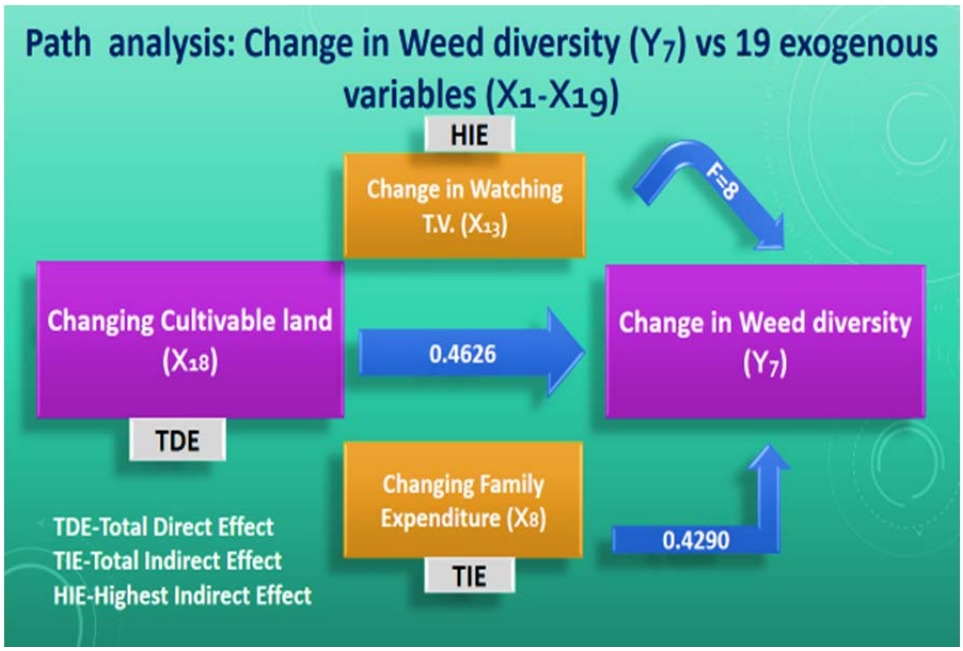


Table 54: Path Analysis: Direct, Indirect and Residual effect;Change in Crop Disease intensity (Y_8) Vs 19 Exogenous Variables (X_1-X_{19})
Residual effect= 0.6672

Variables	Total Effect (r)	Direct Effect (DE)	Indirect Effect (IE)=r-DE	Highest Indirect Effect
Age **(X_1)**	0.1138	0.1059	0.0079	0.0945(X13)
Education **(X_2)**	0.1187	0.1080	0.0107	0.1439(X4)
Family Size **(X_3)**	0.0891	0.0497	0.0394	-0.1134(X14)
Family Education Status **(X_4)**	0.1915	0.1847	0.0068	-0.1429(X8)

ISBN: 978-93-85822-01-8

No. of Vehicles changed **(X_5)**	-0.1554	-0.1475	-0.0079	-0.1058(X13)
Change in Consumption of Kerosene **(X_6)**	0.0423	-0.1420	0.1843	0.1306(X13)
Change in Consumption of Petrol **(X_7)**	0.1121	0.1204	-0.0083	-0.1295(X8)
Changing Family Expenditure **(X_8)**	0.1251	-0.2431	0.3682	0.1416(X18)
Changing Expenditure Allocation on Farming **(X_9)**	-0.1236	0.0495	-0.1731	-0.0794(X14)
Changing Expenditure Allocation on Education **(X_{10})**	0.0509	0.1298	-0.0789	-0.0926(X13)
Changing Expenditure Allocation on Health **(X_{11})**	-0.0820	-0.0233	-0.0587	-0.0781(X14)
Change in Listening to Radio **(X_{12})**	0.0493	-0.0209	0.0702	0.1309(X13)
Change in Watching T.V **(X_{13})**	-0.2326	-0.3159	0.0833	-0.0717(X14)
Changing Interaction with Input Dealers **(X_{14})**	-0.3367	-0.3589	0.0222	-0.0631(X13)
Changing Interaction with Extension Agent **(X_{15})**	-0.1587	0.0246	-0.1833	-0.1613(X13)
Change in Farm Size **(X_{16})**	0.1224	0.0322	0.0902	0.1535(X18)
Changing Cropping Intensity **(X_{17})**	-0.0299	-0.0600	0.0301	0.0540(X19)
Changing Cultivable Land **(X_{18})**	0.1978	0.2673	-0.0695	-0.1287(X8)
Change in Fertilizer Application **(X_{19})**	0.1063	0.1674	-0.0611	-0.1039(X14)

Table 31 shows the Path Analysis to depict the Total Direct Effect, Total Indirect Effect and Residual Effect of 19 exogenous variables on the consequent variable, Change in Crop Disease intensity (Y_8).

ISBN: 978-93-85822-01-8

It has been found that variable, Changing Interaction with Input Dealers (X_{14}), has recorded the Highest Direct Effect while variable, Changing Family Expenditure (X_8), has recorded Highest Indirect Effect on the consequent variable, Change in Crop Disease intensity (Y_8).

Interaction with input dealer, stimulates farmer to control crop disease infestation effectively by taking appropriate preventive and management practices. Input dealers guide farmers to effectively control the disease infestation. Higher family expenditure leads to more investing in controlling crop disease infestation which indirectly helps in decreasing the disease intensity.

The variable, Change in Watching T.V (X_{13}), has routed the Highest Indirect Effect of 7 exogenous variables to characterise the consequent variable, Change in Crop Disease intensity (Y_8). More watching T.V. leads to more acquiring knowledge to control disease infestation, which ultimately helps in decreasing disease intensity.

The Residual Effect being 0.6672, it is to infer that a huge portion of variance (66.72%) in the consequent variable could not be explained. So, it would be more effective if more numbers of variable are included.

ISBN: 978-93-85822-01-8

Model-30

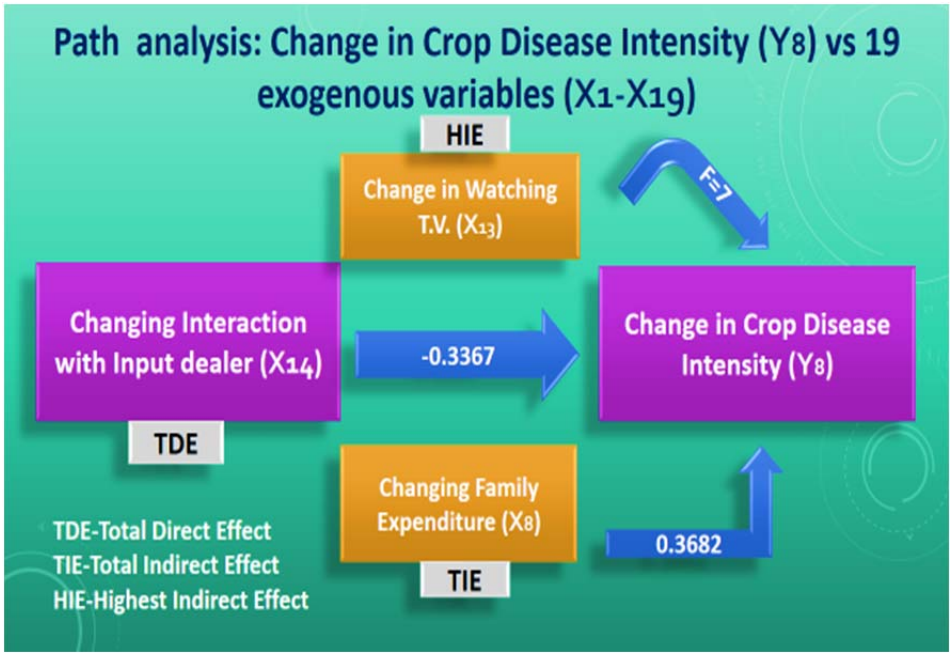


Table 55: Path Analysis: Direct, Indirect and Residual effect; Change in Insect-pest intensity (Y_9) Vs 19 Exogenous Variables (X_1-X_{19})
Residual effect= 0.5881

Variables	Total Effect (r)	Direct Effect (DE)	Indirect Effect (IE)=r-DE	Highest Indirect Effect
Age **(X_1)**	0.1986	0.0225	0.1761	0.1186(X19)
Education **(X_2)**	0.0126	-0.1925	0.2051	0.1467(X4)
Family Size **(X_3)**	0.1883	-0.0427	0.2310	0.1464(X19)
Family Education Status **(X_4)**	0.1053	0.1883	-0.0830	-0.1500(X2)
No. of Vehicles changed **(X_5)**	-0.0013	0.0766	-0.0779	-0.1272(X13)
Change in Consumption of Kerosene **(X_6)**	-0.1857	-0.2725	0.0868	0.1569(X13)
Change in Consumption of Petrol **(X_7)**	0.1884	0.1740	0.0144	-0.1234(X13)

ISBN: 978-93-85822-01-8

Changing Family Expenditure **(X_8)**	0.0300	0.0306	-0.0006	0.1107(X4)
Changing Expenditure Allocation on Farming **(X_9)**	0.0137	0.0525	-0.0388	-0.0744(X10)
Changing Expenditure Allocation on Education **(X_{10})**	-0.0072	0.1316	-0.1388	-0.1112(X13)
Changing Expenditure Allocation on Health **(X_{11})**	0.1086	0.1046	0.0040	0.0309(X10)
Change in Listening to Radio **(X_{12})**	0.0289	0.0029	0.0260	0.1572(X13)
Change in Watching T.V **(X_{13})**	-0.2062	-0.3795	0.1733	0.1127(X6)
Changing Interaction with Input Dealers **(X_{14})**	0.0290	-0.0555	0.0845	0.1572(X19)
Changing Interaction with Extension Agent **(X_{15})**	-0.0031	-0.1863	0.1832	0.2125(X19)
Change in Farm Size **(X_{16})**	-0.0745	0.0730	-0.1475	-0.1157(X19)
Changing Cropping Intensity **(X_{17})**	0.0183	-0.2185	0.2368	0.1751(X19)
Changing Cultivable Land **(X_{18})**	-0.0735	-0.1129	0.0394	-0.0910(X19)
Change in Fertilizer Application **(X_{19})**	0.4171	0.5430	-0.1259	-0.0729(X15)

Table 32 shows the Path Analysis to depict the Total Direct Effect, Total Indirect Effect and Residual Effect of 19 exogenous variables on the consequent variable, Change in Insect-pest intensity (Y_9).

The table has elucidated that the variable, Change in Fertilizer Application (X_{19}), has exerted the Highest Direct Effect while variable, Changing Cropping Intensity (X_{17}), has recorded the Highest Indirect Effect on the consequent variable, Change in Insect-pest intensity (Y_9).

Adequate fertilizer application makes plants more susceptible to insect-pest attack in relation to change dynamics. Applying more fertilizer gradually decreases resistance of plants towards attack of insect-pest. With more

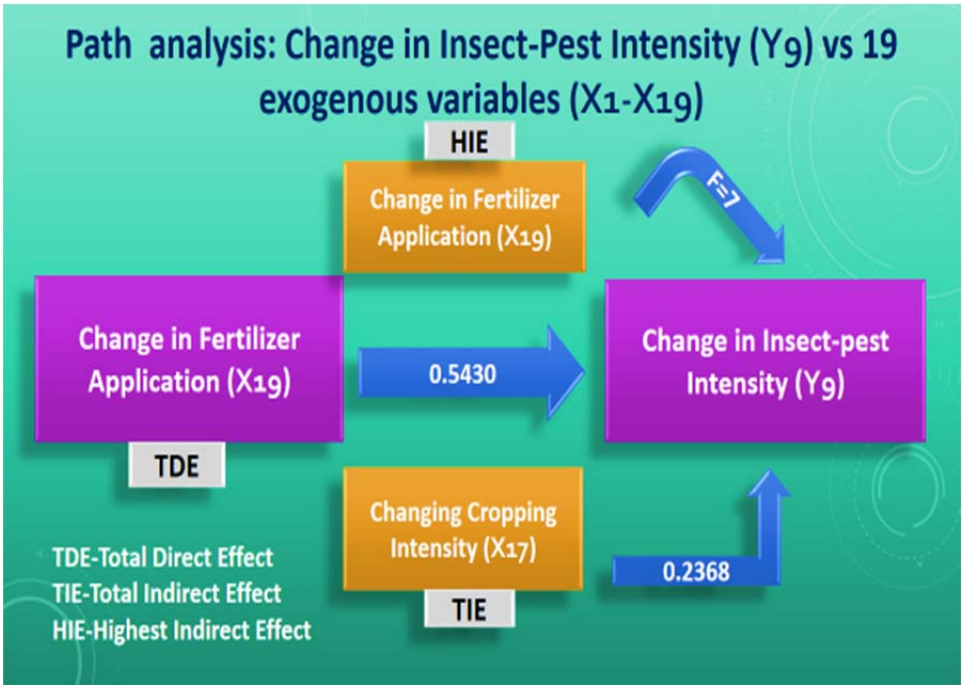
ISBN: 978-93-85822-01-8

cropping intensity, implies taking of more crops in a land within a cropping year, minimizes insect-pest attack by altering soil character through crop rotation.

The variable, Change in Fertilizer Application (X_{19}), has recorded the Highest Indirect Effect of 7 exogenous variables to characterise the consequent variable, Change in Insect-pest intensity (Y_9).

The Residual Effect being 0.5881, it is to conclude that even with combination of 19 exogenous variable, a huge portion of variance (58.81%) embedded with the consequent variable could not be explained. So, it would be more effective if more numbers of variable are included.

Model-31



ISBN: 978-93-85822-01-8

Table 56: Path Analysis: Direct, Indirect and Residual effect; Perceived Climate change effect (Y_{10}) Vs 19 Exogenous Variables
Residual effect- 0.8156

Variables	Total Effect (r)	Direct Effect (DE)	Indirect Effect (IE)=r-DE	Highest Indirect Effect
Age **(X_1)**	-0.1208	-0.1099	-0.0109	0.0645(X2)
Education **(X_2)**	0.1000	-0.1605	0.2605	0.0980(X4)
Family Size **(X_3)**	0.0657	0.0311	0.0346	0.0308(X14)
Family Education Status **(X_4)**	0.1323	0.1257	0.0066	-0.1251(X2)
No. of Vehicles changed **(X_5)**	0.1528	0.1298	0.0230	0.0632(X18)
Change in Consumption of Kerosene **(X_6)**	-0.0564	-0.0085	-0.0479	-0.0598(X5)
Change in Consumption of Petrol **(X_7)**	0.0925	-0.0167	0.1092	0.0750(X4)
Changing Family Expenditure **(X_8)**	0.2054	0.1263	0.0791	0.1215(X18)
Changing Expenditure Allocation on Farming **(X_9)**	-0.1817	-0.1477	-0.0340	0.0424(X2)
Changing Expenditure Allocation on Education **(X_{10})**	0.2231	0.0176	0.2055	0.0835(X9)
Changing Expenditure Allocation on Health **(X_{11})**	0.1568	0.1441	0.0127	-0.0215(X18)
Change in Listening to Radio **(X_{12})**	0.0656	0.1053	-0.0397	0.0475(X13)
Change in Watching T.V **(X_{13})**	-0.0115	-0.1146	0.1031	-0.0478(X2)
Changing Interaction with Input Dealers **(X_{14})**	0.0723	0.0976	-0.0253	-0.0327(X9)
Changing Interaction with Extension Agent **(X_{15})**	0.0458	-0.0081	0.0539	0.0438(X14)
Change in Farm Size **(X_{16})**	0.0849	-0.0807	0.1656	0.1318(X18)

ISBN: 978-93-85822-01-8

Changing Cropping Intensity **(X_{17})**	0.0238	-0.0401	0.0639	-0.0331(X18)
Changing Cultivable Land **(X_{18})**	0.2612	0.2295	0.0317	0.0669(X8)
Change in Fertilizer Application **(X_{19})**	0.0353	0.0954	-0.0601	-0.0385(X18)

Table 33 shows the Path Analysis to elicit the Total Direct Effect, Total Indirect Effect and Residual Effect of 19 exogenous variables on the consequent variable, Perceived Climate change effect (Y_{10}).

The table has elucidated that variable, Changing Cultivable Land (X_{18}), has exerted the Highest Direct Effect whereas variable, Education (X_2), has exerted Highest Indirect Effect on the consequent variable, Perceived Climate change effect (Y_{10}).

Large farmers are getting more affected by the gross effect of climate change. Due to possession of more land, they receive more risk with respect to climate change in terms of loss due to their high investment. More the education, more a person feels about climate change effect. Illiterate farmers suffer loss due to climate change but they fail to recognise the climate change. Education indirectly affects the perception on climate change or global warming though they perceive high fluctuations in rainfall and temperature.

The variable, Changing Cultivable Land (X_{18}), has recorded the Highest Indirect Effect of 6 exogenous variables to characterise the consequent variable, Perceived Climate change effect (Y_{10}). So this variable has got tremendous companionship behaviour to characterize the consequent variable.

ISBN: 978-93-85822-01-8

The Residual Effect being 0.8156, it is to conclude that even with combination of 19 exogenous variable, a huge portion of variance (81.56%) embedded with the consequent variable could not be explained. So, it would be more effective if more numbers of variable are included.

Model-32

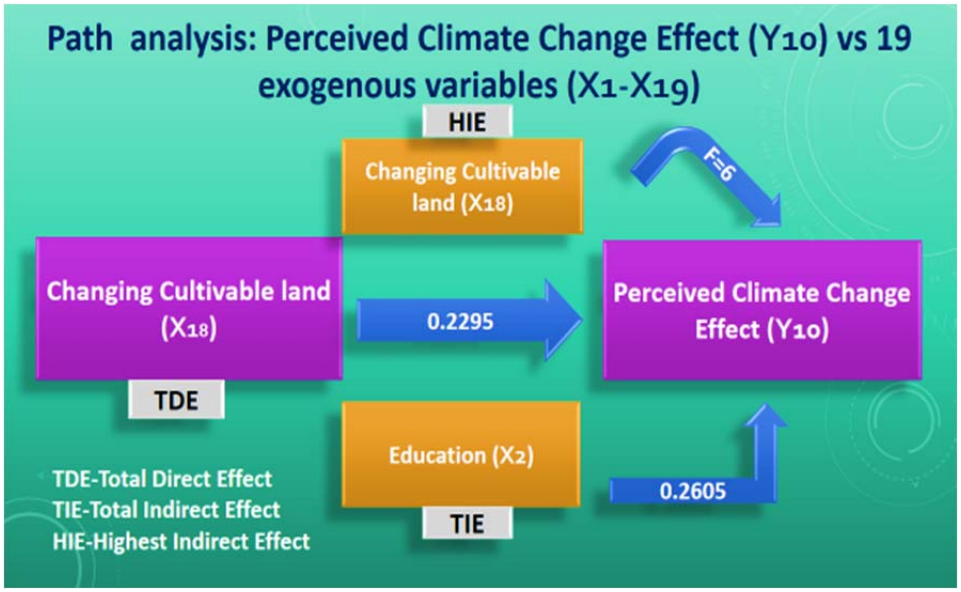


Table 57: Path Analysis: Direct, Indirect & Residual effect; Perceived Climate change effect on Agriculture (Y_{11}) Vs 19 Exogenous Variables Residual effect- 0.7533

Variables	Total Effect (r)	Direct Effect (DE)	Indirect Effect (IE)=r-DE	Highest Indirect Effect
Age **(X_1)**	-0.3094	-0.3912	0.0818	0.1355(X2)
Education **(X_2)**	0.0495	-0.3373	0.3868	0.1571(X1)
Family Size **(X_3)**	-0.0097	-0.0033	-0.0064	-0.1033(X1)

ISBN: 978-93-85822-01-8

Family Education Status **(X_4)**	0.1180	0.1368	-0.0188	-0.2628(X2)
No. of Vehicles changed **(X_5)**	0.1471	0.0690	0.0781	0.0757(X1)
Change in Consumption of Kerosene **(X_6)**	-0.0955	-0.0573	-0.0382	0.0805(X13)
Change in Consumption of Petrol **(X_7)**	0.1292	0.1331	-0.0039	-0.1499(X2)
Changing Family Expenditure **(X_8)**	0.1310	0.0752	0.0558	-0.1731(X2)
Changing Expenditure Allocation on Farming **(X_9)**	-0.1248	-0.0120	-0.1128	-0.1517(X10)
Changing Expenditure Allocation on Education **(X_{10})**	0.3081	0.2682	0.0399	0.1230(X1)
Changing Expenditure Allocation on Health **(X_{11})**	0.1103	0.0474	0.0629	0.0631(X10)
Change in Listening to Radio **(X_{12})**	-0.0555	-0.0408	-0.0147	0.0806(X13)
Change in Watching T.V **(X_{13})**	0.0656	-0.1946	0.2602	-0.1005(X2)
Changing Interaction with Input Dealers **(X_{14})**	0.1007	0.1371	-0.0364	-0.0442(X15)
Changing Interaction with Extension Agent **(X_{15})**	0.0206	-0.0984	0.1190	0.0616(X114)
Change in Farm Size **(X_{16})**	0.1215	0.0308	0.0907	0.0862(X1)
Changing Cropping Intensity **(X_{17})**	-0.0499	-0.1388	0.0889	0.0340(X19)
Changing Cultivable Land **(X_{18})**	0.1394	-0.0284	0.1678	0.0826(X10)
Change in Fertilizer Application **(X_{19})**	-0.0494	0.1055	-0.1549	-0.0854(X1)

Table 34 shows the Path Analysis to depict the Total Direct Effect, Total Indirect Effect and Residual Effect of 19 exogenous variables on the consequent variable, Perceived Climate change effect on Agriculture (Y_{11}).

ISBN: 978-93-85822-01-8

The table has elucidated that variable, Age (X_1), has exerted the Highest Direct Effect whereas variable, Education (X_2), has exerted Highest Indirect Effect on the consequent variable, Perceived Climate change effect on Agriculture (Y_{11}).

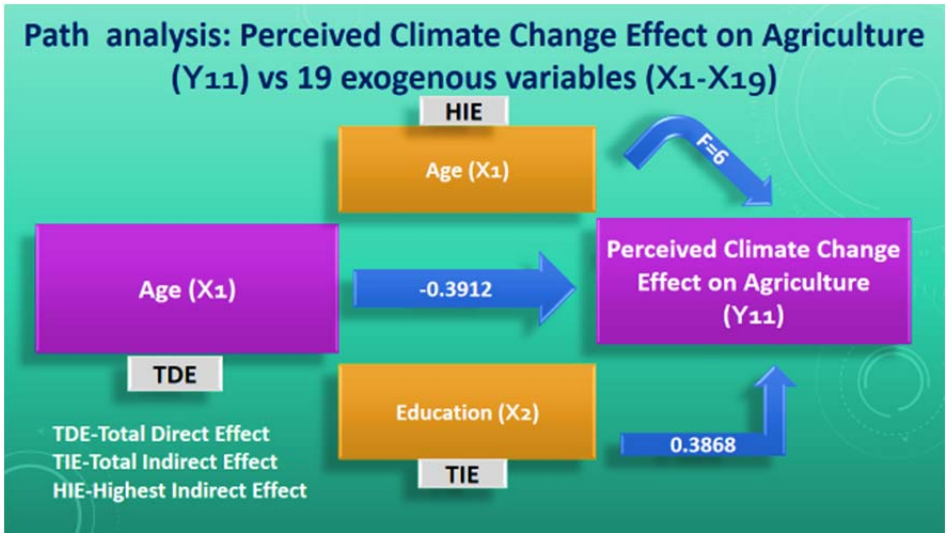
Young farmers are getting more impacted by the perceived climate change effect on agriculture. Due to their better education & better perception, they can efficiently recognise the effect of climate change on agriculture, while the elder farmers have failed to do so. Educated farmers feel the brunt effect of climate change on agriculture. They know the causes and effect of climate change and that's why they are adopting more to modern and appropriate technologies to combat against the brunt of change dynamics. Relatively less literate farmers suffer loss due to climate change but they fail to perceive the climate change effect on agriculture due to lack of knowledge.

The variable, Age (X_1) has recorded the Highest Indirect Effect of 6 exogenous variables to characterise the consequent variable, Perceived Climate change effect on Agriculture (Y_{11}). So this variable has got tremendous companionship behaviour to characterize the consequent variable.

The Residual Effect being 0.7533, it is to conclude that even with combination of 19 exogenous variable, a huge portion of variance (75.33%) embedded with the consequent variable could not be explained. So, it would be more effective if more numbers of variable are included.

ISBN: 978-93-85822-01-8

Model-33



8.4 FACTOR ANALYSIS

Table 58: Factor Analysis: Conglomeration of 19 variables in 7 factors

Factors	Variables	Factor Loading	% of Variance	Cumulative %	Factors Renamed
Factor 1	Education **(X_2)**	0.729	20.22	20.217	**Energy Consumption**
	Family Education Status **(X_4)**	0.775			
	Change in Consumption of Petrol **(X7)**	0.660			
	Changing Family Expenditure **(X8)**	0.725			
	Changing Expenditure Allocation on Education **(X_{10})**	0.536			
	Change in Watching T.V **(X_{13})**	0.606			

ISBN: 978-93-85822-01-8

Factor 2	Family Size **(X_3)** Change in Consumption of Kerosene **(X_6)** Changing Expenditure Allocation on Farming **(X_9)** Interaction with Input Dealers **(X_{14})** Changing Interaction with Input Dealers **(X_{14})** Change in Farm Size **(X_{16})** Change in Fertilizer Application **(X_{19})**	0.534 -0.643 0.433 0.673 0.585 -0.514 0.543	15.70	35.911	**Communication Network**
Factor 3	No. of Vehicles changed **(X_5)**	-0.476	9.30	45.206	
Factor 4	Age **(X_1)** Changing Cultivable Land **(X_{18})**	0.512 0.525	6.65	60.261	**Resource Status**
Factor 5	Changing Expenditure Allocation on Health **(X_{11})**	-0.624	5.41	71.268	
Factor 6	Change in Listening to Radio **(X_{12})**	0.559	5.15	76.416	
Factor 7	Changing Cropping Intensity **(X_{17})**	0.581	4.12	80.538	

ISBN: 978-93-85822-01-8

Factor 1

Rename: Energy Consumption

Variables accommodated: Education (X_2), Family Education Status (X_4), Change in Consumption of Petrol (X_7), Changing Family Expenditure (X_8), Changing Expenditure Allocation on Education (X_{10}), and Change in Watching T.V (X_{13})

Variance contributed: 20.22%

Revelation: This constellation of variables, Energy Consumption, has come up with a strong explicability level for predicting the change pattern of social ecology of Chilika. The change in change in fertilizer consumption… can be conceived as important operational indicator to estimate the change pattern.

Factor 2

Rename: Communication Network

Variables accommodated: Family Size (X_3), Change in Consumption of Kerosene (X_6), Changing Expenditure Allocation on Farming (X_9), Interaction with Input Dealers (X_{14}), Changing Interaction with Input Dealers (X_{14}), Change in Farm Size (X_{16}), Change in Fertilizer application (X_{19})

Variance contributed: 15.70%

Revelation: Communication network, consisting of 7 homogenous variables, has played a vital role in estimating the change pattern of the social ecology of Chilika. Any communication network can go as both sink and source of information and accordingly has contributed substantially towards the variance in the ecological behaviour.

ISBN: 978-93-85822-01-8

Factor 3

Rename: No. of Vehicles changed (Unchanged)

Variables accommodated: No. of Vehicles changed (X_5)

Variance contributed: 9.30%

Revelation: Since this is a factor with solitary variables, there is no need to rename it. Nevertheless it has contributed 9.30% variance.

Factor 4

Rename: Resource Status

Variables accommodated: Age (X1), Changing Cultivable Land (X_{18})

Variance contributed: 6.65%

Revelation: This factor, presents the individual possession on different resources contributing to income. Livelihood, productivity. So, logically these are attuned to the pace and direction to the ecological changes and the respondent have elicited it through their perceptual analysis on resource and its subsequent changes over time.

Factor 5

Rename: Changing Expenditure Allocation on Health (Unchanged)

Variables accommodated: Changing Expenditure Allocation on Health (X_{11})

Variance contributed: 5.41%

Revelation: Since this is a factor with solitary variables, there is no need to rename it.

Factor 6

Rename: Change in Listening to Radio (Unchanged)

Variables accommodated: Change in Listening to Radio (X_{12})

ISBN: 978-93-85822-01-8

Variance contributed: 5.15%

Revelation: Since this is a factor with solitary variables, there is no need to rename it.

Factor 7

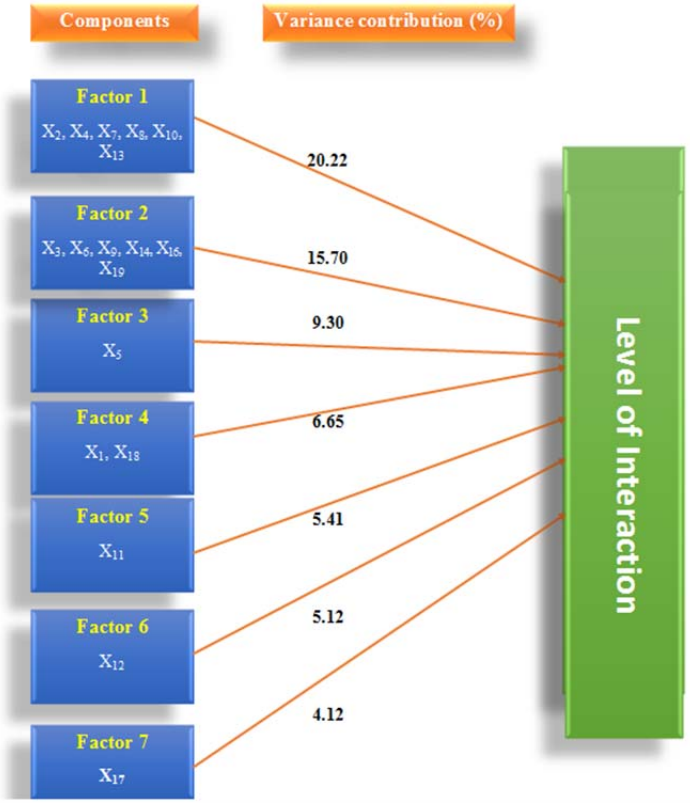
Rename: Changing Cropping Intensity (Unchanged)

Variables accommodated: Changing Cropping Intensity (X_{17})

Variance contributed: 4.12%

Revelation: Since this is a factor with solitary variables, there is no need to rename it.

Model 34

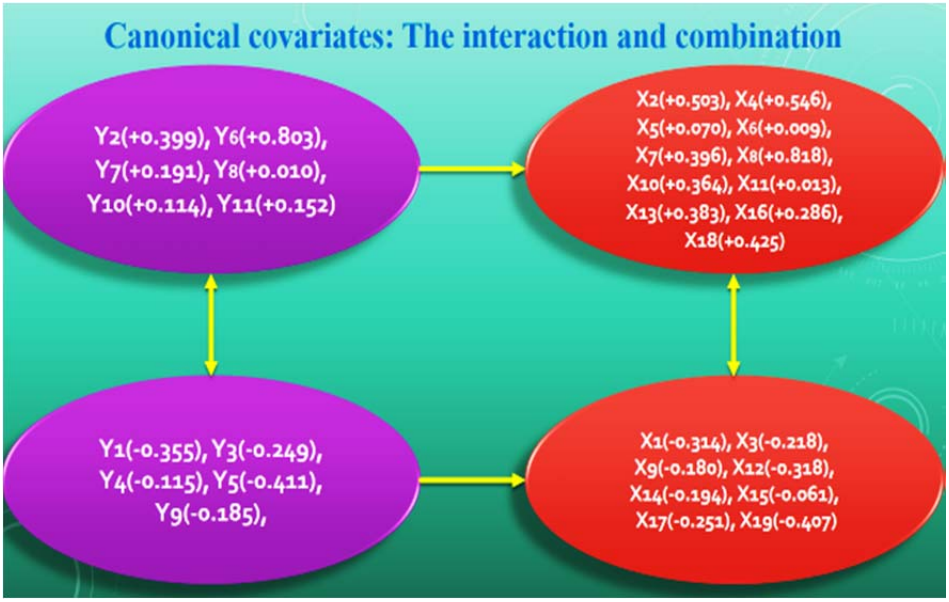


ISBN: 978-93-85822-01-8

8.5 Canonical covariates: The interaction and combination

Canonical covariate analysis has been carried out to depict the clandestine interaction and combination between two sets of variable i.e. Left and Right sets of variables. This analysis has got tremendous strategic importance.

Model 35



The model depicts that, from the left side (Set-I) variables (Y), the following consequent variables like, Change in Perceived effect of T.V. (Y_2), Change in Family income (Y_6), Change in Weed diversity (Y_7), Change in Crop Disease intensity (Y_8), Perceived Climate change effect (Y_{10}), Perceived Climate change effect on Agriculture ($_{11}$), have shown clear choices to select the following exogenous variables i.e. from the right sets of variables like, Education (X_2), Family Education Status (X4), No. of Vehicles changed (X_5) , Change in Consumption of Kerosene (X_6), Change

ISBN: 978-93-85822-01-8

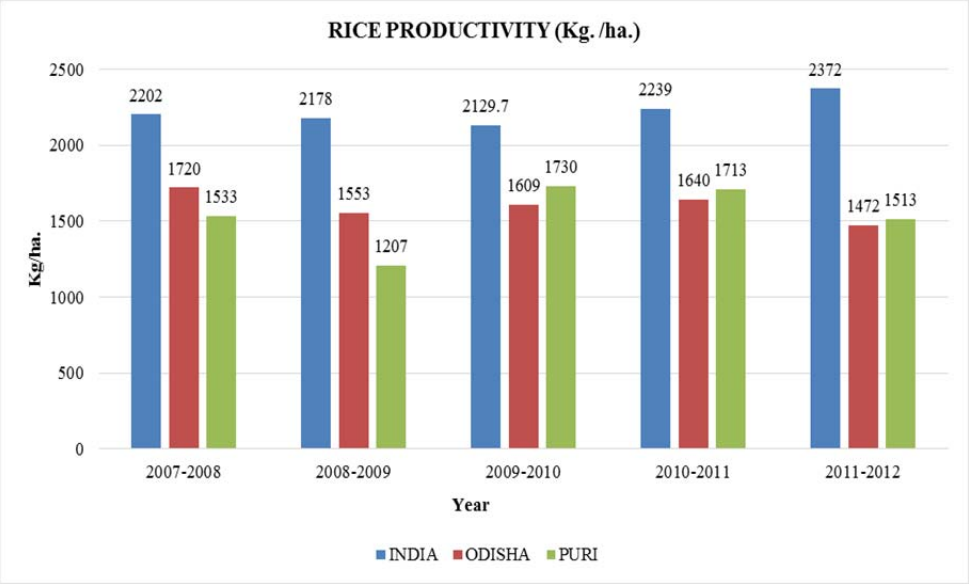
in Consumption of Petrol (X_7), Changing Family Expenditure (X8), Changing Expenditure Allocation on Education (X_{10}), Changing Expenditure Allocation on Health (X_{11}), Change in Watching T.V (X_{13}), Change in Farm Size (X_{16}), Changing Cultivable Land (X_{18}).

The model shows that, at the first stage, the combination of consequent variables, Y_2, Y_6, Y_8, Y_{10}, Y_{11}, can be branded together as Climate Change Perception, that have selectively been ductile to the set of agricultural modernity variables (X_2, X_4, X_5, X_6, X_7, X_8, X_{10}, X_{11}, X_{13}, X_{16}, X_{18}), which again can be collectively branded as Agricultural Modernity and similarly, at the stage 2, the consequent variables like, Change in Perceived Effect of Radio (Y_1), Change in Perceived Effect of Input dealer (Y_3), Change in Perceived Effect of Extension agent (Y_4), Change in Productivity (Y_5), Change in Insect-pest intensity (Y_9), have shown clear choices to select the following exogenous variables i.e. from the right sets of variables like, Age (X_1), Family Size (X_3), Changing Expenditure Allocation on Farming (X_9), Change in Listening to Radio (X_{12}), Changing Interaction with Input Dealers (X_{14}), Changing Interaction with Extension Agent (X_{15}), Changing Cropping Intensity (X_{17}), Change in average fertilizer dose (X_{19}). It shows that. The combination of left side variables (Y_1, Y_3, Y_4, Y_5, Y_9) can be termed as Cosmopolite Information on Productivity Factor and have been ductile to the following set of right side variables (X_1, X_3, X_9, X_{12}, X_{14}, X_{15}, X_{17}, X_{19}), which again can be branded as Family Resource and Interaction Character.

Table 59: Productivity (kg. /ha.) of Rice

Year	India	Odisha	Puri
2007-2008	2202.0	1720	1533
2008-2009	2178.0	1553	1207
2009-2010	2129.7	1609	1730
2010-2011	2239	1640	1713
2011-2012	2372	1472	1513

Graphical delineation 1



The figure suggests that the productivity of rice throughout Puri and Odisha has been stagnating over the decades mention here. While the same for the national level has also been turned plating.

Rice productivity in the Puri district, has recorded a kind of undulating pattern, where in some of declines are very conspicuous (2007-10) over the others. The fluctuating nature of rice productivity in Puri can well be

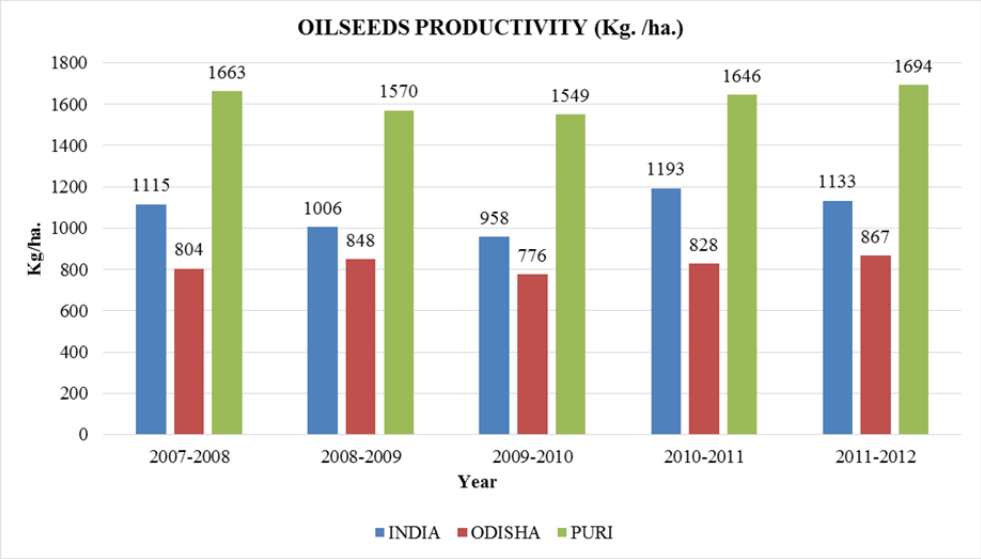
ISBN: 978-93-85822-01-8

attributed to the ecological instability and might be associated with climate change characters.

Table 60: Productivity (Kg. /ha.) of Oilseeds

Year	India	Odisha	Puri
2007-2008	1115	804	1663
2008-2009	1006	848	1570
2009-2010	958	776	1549
2010-2011	1193	828	1646
2011-2012	1133	867	1694

Graphical delineation 2



The figure suggests that the productivity of oilseeds throughout Puri is at better level than stagnating productivity of Odisha over the decades mention here. While the same for the national level has also been turned plating. Still the productivity of coastal district, was fluctuating during 2007, 2008 and 2009 due to erratic climatic factor.

ISBN: 978-93-85822-01-8

Table 61: Rainfall, Fertilizer consumption and Kharif Rice Production of Odisha

Sl. No.	Year	Normal Rainfall (mm)	Actual rainfall (mm)	Fertilizer Consumption (kg/ha.)	Kharif Rice Production (lakh Mts.)	Remarks
1	1961	1502.5	1262.8	0.8	36.99	
2	1962	1502.5	1169.9	0.8	36.32	
3	1963	1502.5	1467.0	0.9	42.47	
4	1964	1502.5	1414.1	1.2	43.59	
5	1965	1502.5	997.1	1.9	31.89	Severe drought
6	1966	1502.5	1134.9	2.2	35.37	Drought
7	1967	1502.5	1326.7	3.2	34.43	Cyclone & Flood
8	1968	1502.5	1296.1	3.6	38.48	Cyclone & Flood
9	1969	1502.5	1802.1	3.7	38.39	Flood
10	1970	1502.5	1660.2	4.1	39.13	Flood
11	1971	1502.5	1791.5	7.3	33.76	Flood, Severe Cyclone
12	1972	1502.5	1177.1	8.1	37.35	Drought, flood
13	1973	1502.5	1360.1	8.7	41.91	Flood
14	1974	1502.5	951.2	6.9	29.67	severe drought
15	1975	1502.5	1325.6	6.7	42.74	Flood
16	1976	1502.5	1012.5	8.6	29.58	Severe drought
17	1977	1502.5	1326.9	8.2	40.50	Flood
18	1978	1502.5	1261.3	8.7	41.89	Tornados, hail storm
19	1979	1502.5	950.7	8.3	27.34	Severe drought

ISBN: 978-93-85822-01-8

20	1980	1502.5	1321.7	8.7	40.31	Flood, drought
21	1981	1502.5	1187.4	9.7	36.63	Flood, drought, Tornado
22	1982	1502.5	1179.9	10.4	27.07	High flood, drought, cyclone
23	1983	1502.5	1374.1	10.8	47.63	
24	1984	1502.5	1302.8	12.7	38.50	Drought
25	1985	1502.5	1606.8	15.7	48.80	Flood
26	1986	1502.5	1566.1	16.4	44.56	
27	1987	1502.5	1040.8	16.7	31.03	Severe drought
28	1988	1502.5	1270.5	22	48.96	
29	1989	1502.5	1283.9	21.7	58.40	
30	1990	1502.5	1865.8	20.1	48.42	Flood
31	1991	1502.5	1465.7	20	60.30	
32	1992	1502.5	1344.1	21.6	49.76	Flood, drought
33	1993	1502.5	1421.6	21.3	61.02	
34	1994	1502.5	1700.2	22.7	58.31	
35	1995	1502.5	1588.0	24.6	56.48	
36	1996	1502.5	990.1	30.5	38.27	Severe drought
37	1997	1502.5	1493.0	35	57.51	
38	1998	1502.5	1277.5	36	48.85	Severe drought
39	1999	1502.5	1435.7	42	42.75	Severe Cyclone
40	2000	1502.5	1035.1	41	41.72	Drought & Flood
41	2001	1502.5	1616.2	41	65.71	Flood
42	2002	1502.5	1007.8	39	28.26	
43	2003	1502.5	1663.5	39	61.99	Flood

ISBN: 978-93-85822-01-8

44	2004	1502.5	1273.6	43	58.84	Moisture stress
45	2005	1502.5	1519.5	46	62.49	Moisture stress
46	2006	1502.5	1682.8	47	61.96	Moisture stress/ Flood
47	2007	1502.5	1591.5	52.1	68.26	Flood
48	2008	1502.5	1523.6	56	60.92	Flood, Moisture stress
49	2009	1502.5	1362.6	58	62.93	Flood /Moisture stress/Pest attack
50	2010	1502.5	1293.0	62	60.51	Drought/ Un-seasonal rain
51	2011	1502.5	1327.8	62.25	51.27	Flood/ Drought
52	2012	1502.5	1391.3	62.5	86.81	Drought
53	2013	1502.5		62		Super Cyclone, Flood

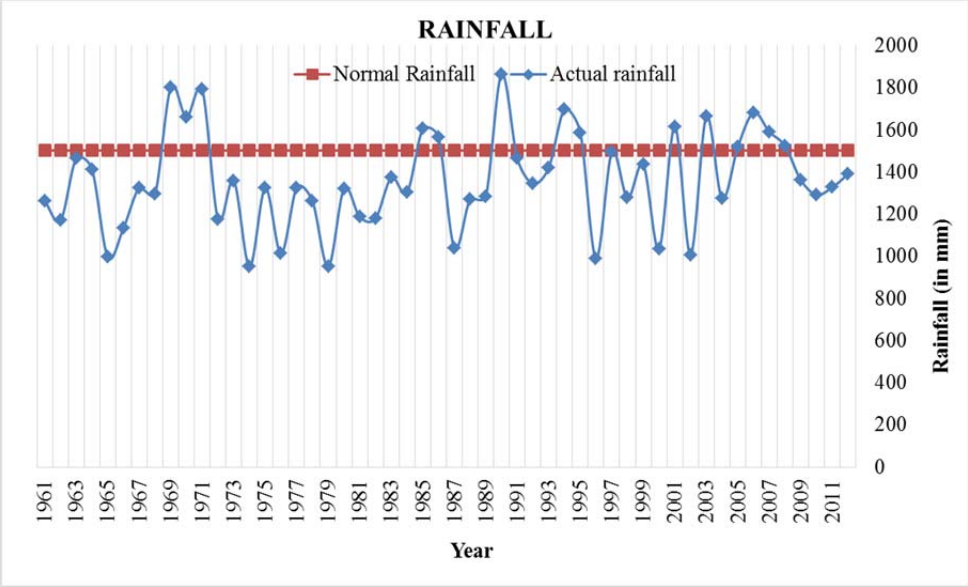
(*Source*: Status of Agriculture in Odisha, Directorate of Agriculture, Odisha)

Out of 53 years only 13 years have been normal years. This almost puts the state with a 75% probability of being visited by natural calamity of any kind. This has been reflected in the stagnating yield of food crops over the couple of decades, even though the application of fertilizer in crop field is increasing and at the same time, a shift of occupation from farm to nonfarm

ISBN: 978-93-85822-01-8

economy has been well discernable. This has also negated the positive impact of modern technology in the operating farms.

Graphical delineation-3: Rainfall: 1961-2012



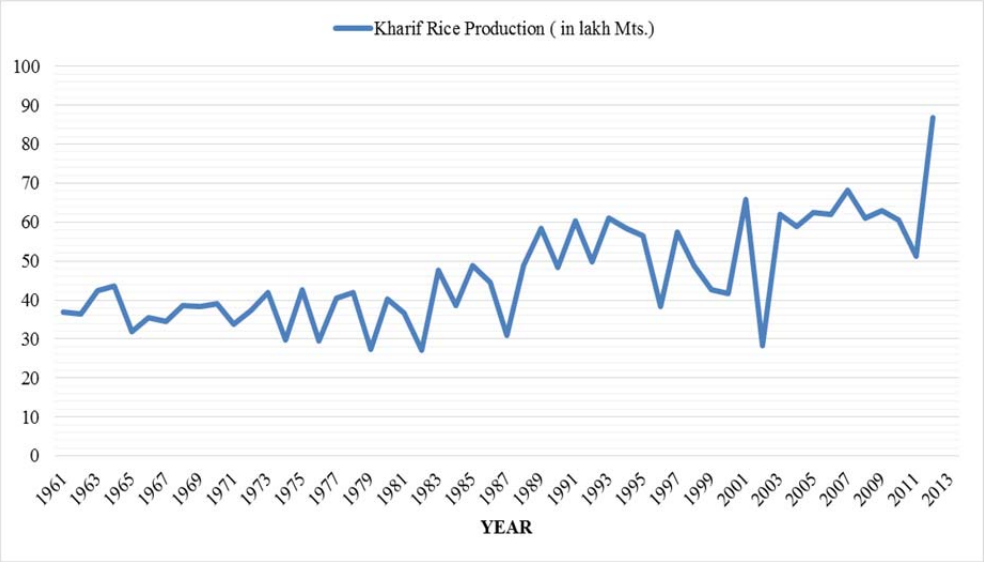
The graphical delineation 1 presents the distribution of rainfall in Odisha. From 1961 to 2012. It shows that baring few couples of years ,rests of the years are suffering from below normal rainfall, specially the cohort 1972-1984, has been consistently suffering from below normal rainfall.

Graphical delineation-4: Kharif rice production: 1961-2012

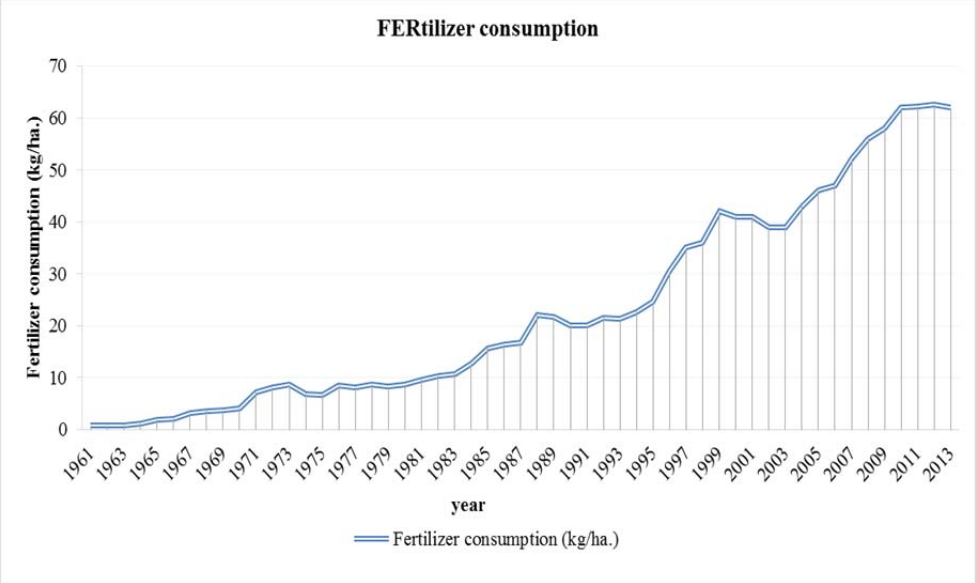
The graphical delineation 2 presents the two, kharif rice production from 1961 to 2013 and graphical delineation 3 presents the patterns of fertilizer consumption between1961 to 2008. By taking 2 patterns into consideration, it can be seen that the level of fertilizer consumption has not well been reflected to increase the production of kharif rice. Kharif rice being an

ISBN: 978-93-85822-01-8

inevitable predictant to monsoon rainfall, the gradual erratic nature of monsoon rainfall might have neglected the fertilizer consumption.



Graphical delineation-5: Fertilizer consumption: 1961-2013



ISBN: 978-93-85822-01-8

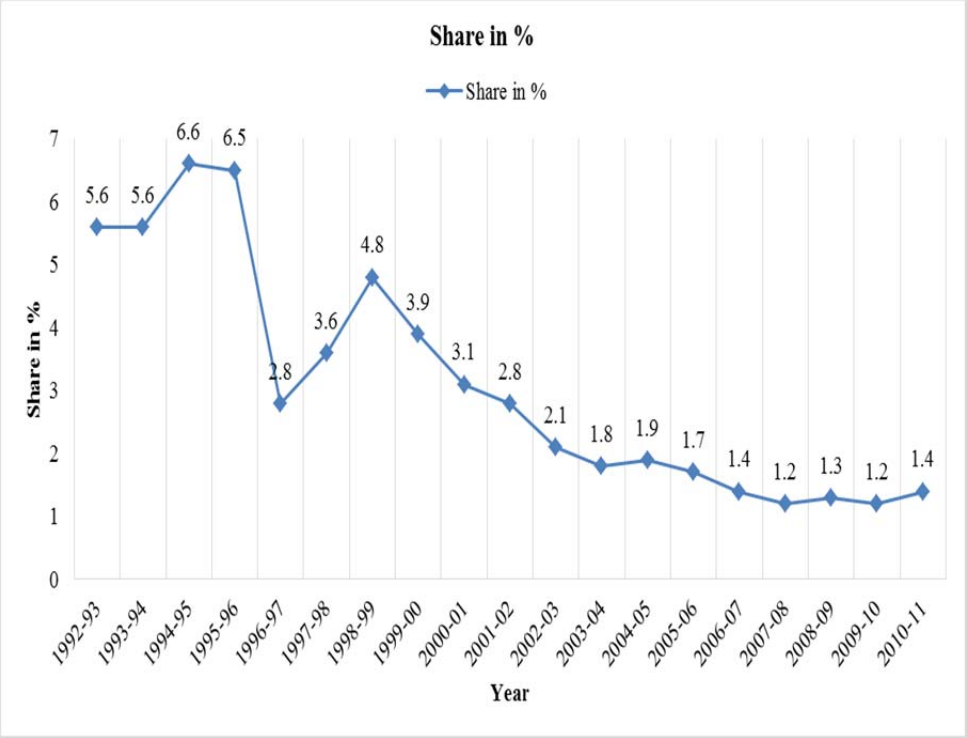
From 1967 to 1987, there has been a clear dent of increase in fertilizer consumption but kharif rice production has been plating because if you see into the rainfall pattern of the same period, it was the period of below normal rainfall. So, the dividend from increase fertilizer application on productivity of Aman rice has been neglected by the erratic rainfall.

Table 62: Power consumption of Odisha

Year	Share of power consumption for Agriculture Purpose	
	In million units	In %
1	2	3
1992-93	305.00	5.6
1993-94	341.00	5.6
1994-95	426.00	6.6
1995-96	491.00	6.5
1996-97	150.00	2.8
1997-98	201.00	3.6
1998-99	258.00	4.8
1999-00	217.00	3.9
2000-01	186.00	3.1
2001-02	164.00	2.8
2002-03	139.00	2.1
2003-04	124.00	1.8
2004-05	147.00	1.9
2005-06	137.00	1.7
2006-07	131.00	1.4
2007-08	132.00	1.2
2008-09	155.00	1.3
2009-10	158.00	1.2
2010-11	188.00	1.4

ISBN: 978-93-85822-01-8

Graphical delineation 6



The power consumption for Irrigation and other practices in Agriculture is in declining trend. Minor irrigation programme cannot be successful without large-scale rural electrification. The share of power consumption for Agriculture Purpose since 1992-93 is indicated above, which indicates the gradual declining of share of power consumption in Agriculture. Low power consumption in agriculture acts as hurdle in adopting the modern agriculture.

ISBN: 978-93-85822-01-8

Table 63: Annual fish, prawn & crab landing of Chilika from 1985-86 to 2011-12

Ichthyofaunal diversity is the most important bio-indicator to estimate and elucidate the impact of climate change in a given ecosystem. The present study has estimated this by calculating the volume of fish landing from different years (1985-2012). A list of fish biodiversity has also been annextured in addition to fish landing data.

YEAR	Fish (t.)	Prawn (t.)	Total (Fish+Prawn)	Crab (t.)	Total Landing in t.
1985-86	7446.00	1144.00	8590.00	79.00	**8669.00**
1986-87	7283.00	1589.00	8872.00	54.00	**8926.00**
1987-88	6863.00	1241.00	8104.00	39.00	**8143.00**
1988-89	5211.00	917.00	6128.00	44.00	**6172.00**
1989-90	5493.00	1177.00	6670.00	36.00	**6706.00**
1990-91	3792.00	481.00	4273.00	24.00	**4297.00**
1991-92	3680.00	876.00	4556.00	30.00	**4586.00**
1992-93	3207.00	951.00	4158.00	15.00	**4173.00**
1993-94	2799.00	686.00	3485.00	11.00	**3496.00**
1994-95	1239.00	176.00	1415.00	3.00	**1418.00**
1995-96	1056.00	213.00	1269.00	5.00	**1274.00**
1996-97	1352.00	281.00	1633.00	12.00	**1645.00**
1997-98	1491.51	149.51	1641.50	10.40	**1651.90**
1998-99	1555.75	136.93	1692.68	9.68	**1702.36**
1999-00	1556.32	180.40	1736.72	9.03	**1745.75**
2000-01	3592.95	1296.26	4889.21	93.54	**4982.75**
2001-02	9530.03	2347.78	11877.81	111.07	**11988.88**
2002-03	8265.16	2478.82	10743.98	149.81	**10893.79**
2003-04	10286.34	3611.37	13897.71	155.51	**14053.22**
2004-05	8097.77	5000.71	13098.48	161.89	**13260.37**
2005-06	7774.81	4296.02	12070.83	154.08	**12224.91**
2006-07	6463.92	3368.97	9832.89	122.94	**9955.83**
2007-08	6610.23	3298.08	9908.31	139.12	**10047.43**
2008-09	6534.85	3929.68	10464.53	237.50	**10702.03**

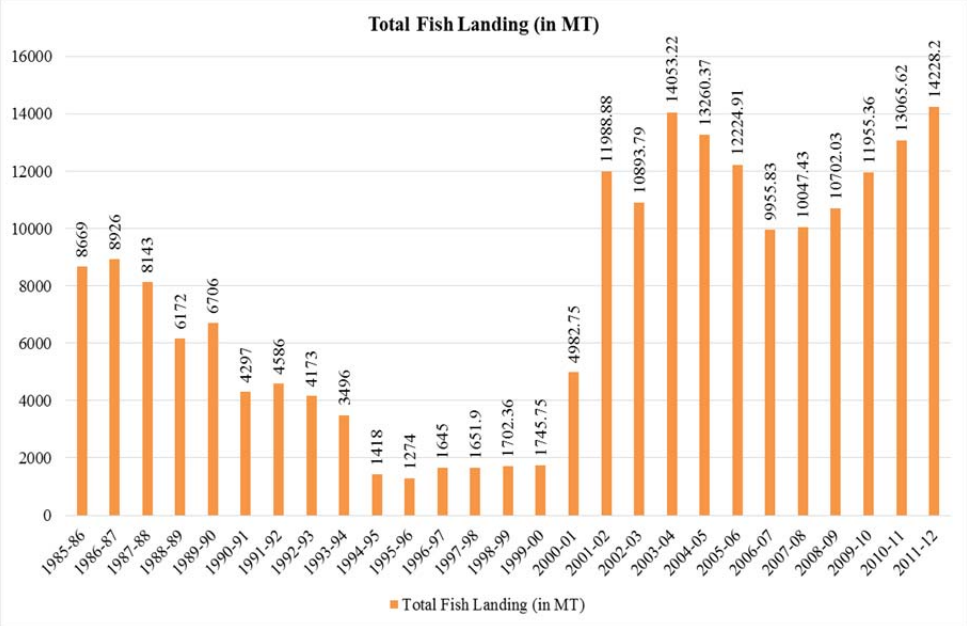
ISBN: 978-93-85822-01-8

2009-10	7892.98	3851.49	11744.47	210.89	**11955.36**
2010-11	7736.54	5043.18	12779.72	285.90	**13065.62**
2011-12	7456.03	6413.91	13869.94	358.26	**14228.20**

(CDA, 2013)

The gradual decline of fish landing study from 1985 to 2000 has been due to over-netting, increase of salinity of Chillika lake and also its pollution load from the surrounding agricultural field. Climate change and global warming have added some stress factors towards dealing through increase salinity and siltation of natural lake. But opening of new mouth during 2001-02, have invited a new biance in lake water with belligerence in fish population reflected through increase fish landing scenario. So this is a good example, where in anthropogenic inference has rightly added to ecological health and resilience.

Graphical delineation 7



ISBN: 978-93-85822-01-8

Table 64: List of important fishes to indicate the ichthyofaunal diversity status of Chilika.

Fresh Water Species		Marine species	
Local Name	**Scientific Name**	**Local Name**	**Scientific Name**
Bhakur	Catla catla	Borai	Sciaena glaucus
Chitala	Notopterus chitala	Sankucha	Trygon sephen
Kalabainsi	Labeo calbasu	Choeli	Thrissocles species
Kau	Anabas scandens	Seba Khainga	Chanos chanos
Kerandi	Barbus species	Khanda magar	Pristis species
Mirkali	Cirrhina mrigala	Munda magar	Carcharhinus gangeticus
Pohala	Cirrhina reba	Mota magar	Carcharhinus limbatus
Rohi	Labeo rohita	Kabla	Sardinella fimbriata
Seula	Ophicephalus striatus	Baghua magar	Galeocerdo rayneri
Magur	Clarius batrachus	Khainga	Mugil cephalus

Table 65: Bird population in Chilika during winter

Year	Birds No.	% Change
2005	958681	
2006	678783	**-29.20**
2007	839529	**23.68**
2008	892998	**6.37**
2009	890813	**-0.24**
2010	924578	**3.79**
2011	804452	**-12.99**
2012	877230	**9.05**
2013	719262	**-18.01**

The incoming of migratory birds is on decline between 2012 to 2013 and it is very conspicuous by having the decline data 18.01% over previous year.

ISBN: 978-93-85822-01-8

The late arrival of winter season and soaring of mean winter temperature may be attributed to these decline. The overhauling of natural setup in welcoming urbanisation and associated deforestation in the catchment area are also responsible for this decline.

Table 66: Matrix Ranking: Participatory Perceptual Analysis on Dominant Problems Affecting Rural Life in Chilika Social Ecology

Attributes / Problems	No. of people affected	Severity of impact	Frequency of impact	Score	Rank
Irrigation	7	7	8	**22**	**2nd**
Disease-pest attack	6	6	7	**19**	**4th**
Low quality seeds	7	5	5	**17**	**5th**
Salinity	8	6	7	**21**	**3rd**
Climate Change	9	8	7	**24**	**1st**
Lack of knowledge	5	6	6	**17**	**5th**
Total	**42**	**38**	**40**	**120**	

The brunt of climate change is predominated, has been evinced in the participatory matrix ranking by local people. It has been found that the perceived effect of climate changes is the highest followed by lack of irrigation and salinity problem. This shows that, the natural networking of problems among three negative actors i.e. climate change, irrigation and salinity.

ISBN: 978-93-85822-01-8

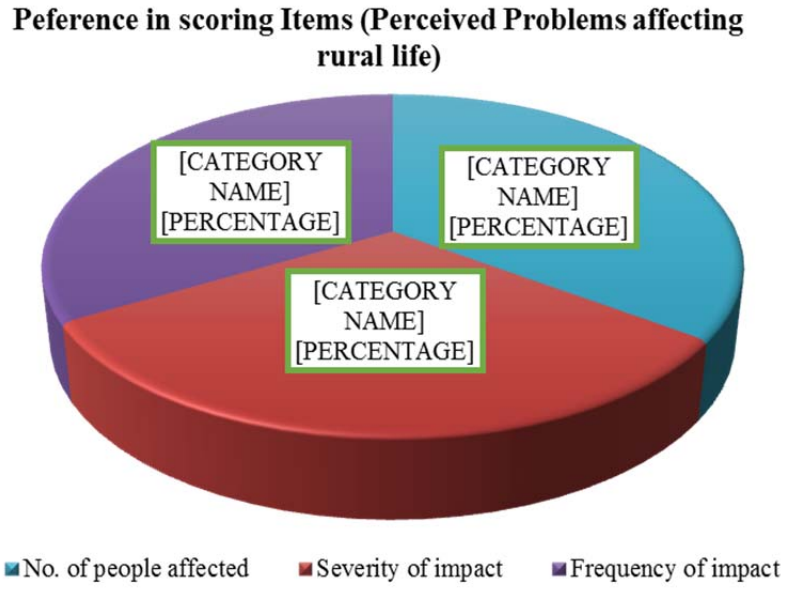


Table 67: Matrix Ranking: Participatory Perceptual Analysis on Choices and Ranking of Rice varieties

Attributes / Varieties	Production	Cooking quality	Scent	Disease-pest free	Climatic resistant	Profit	Total	Rank
Nadiarasa	3	6	6	4	3	4	**26**	**7th**
Tulasibasa	3	7	8	4	3	3	**28**	**5th**
Padmakeshari	2	5	6	3	3	2	**21**	**8th**
Ratantudi	5	5	5	3	4	5	**27**	**6th**
Narada	5	6	5	6	8	6	**36**	**2nd**
Masuri	8	7	5	7	6	8	**41**	**1st**
Swarna	7	6	4	5	6	6	**34**	**3rd**
1014	6	5	4	5	5	6	**31**	**4th**
Total	**39**	**47**	**43**	**37**	**38**	**40**		

ISBN: 978-93-85822-01-8

In this participatory analytical process, the local people has selected 7 rice varieties grown in that area. The attributes are, Production, Cooking quality, Scented, Disease-pest free, Climatic resistant, Profit. It has been found that, the variety Masuri has splendidly combine production, profit, resilience to climate change and it has ranked the first position followed by Narada, Swarna etc. According to people perception, the variety Narada gives less production than Masuri, Swarna, 1014, but the variety has good resilience to climate change. That's why the variety Narada is so popular in coastal areas.

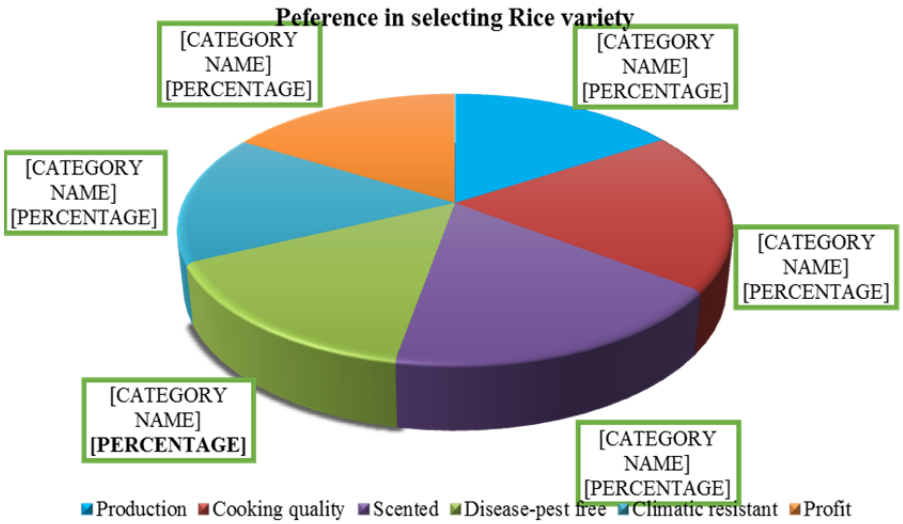


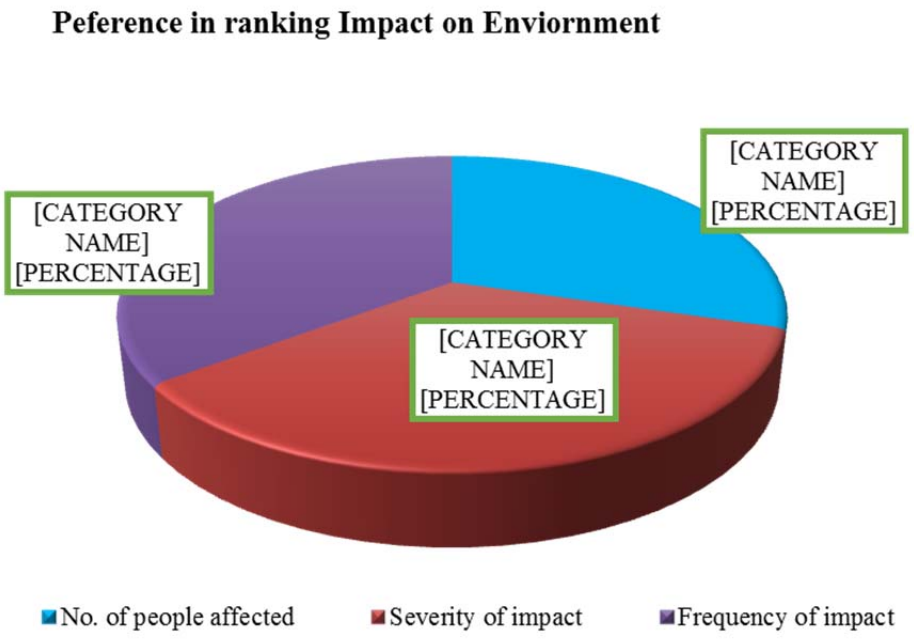
Table 68: Matrix Ranking: Participatory Perceptual Analysis on Causes of Environment Degradation

Attributes / Problems	No. of people affected	Severity of impact	Frequency of impact	Score	Rank
Deforestation	7	8	6	**21**	**1st**
Over-netting	6	6	7	**19**	**3rd**

ISBN: 978-93-85822-01-8

Vehicles	5	6	6	**17**	**5th**
Population growth	5	8	7	**20**	**2nd**
Tourist pressure	4	4	5	**13**	**6th**
More Boats	5	6	7	**18**	**4th**
Total	**32**	**38**	**38**		

In this participatory analytical process, the local people have pointed out various problems lead to environment degradation like Deforestation, Over-netting, Vehicles, Population growth, Tourist pressure, More no. of Boats and ranked among them according to some attributes like, No. of people affected, Severity of impact, Frequency of impact. Deforestation is found as the main contributor towards environment degradation, followed by Population growth pressure, Over-netting, more no. of boats, etc.



ISBN: 978-93-85822-01-8

Table 69: Distribution of respondents according to perceived risks (N=80)

Risk	No.	Explanation	Rank
Increase in crop diseases	63 (78.75%)	There was increased phenomenon of certain type of disease, like- blast in seedbed of paddy, yellowing of leaves, curling of leaves and rotting of seedlings etc. of different crops.	**1**
Reduction in Agricultural production	47 (58.75%)	Reduction in yield of different Rabi crops due to high temperature and also Kharif paddy due to less rainfall	**6**
Increase in insect-pest attack	45 (56.25%)	Increase in the attack of different types of jassids and micro-incidences organisms.	**7**
Increase in incidence of salinity	52 (65%)	Due to sea level rising and increase in temperature, the problem of salinity is increasing to a significant extent. Increase in temperature leads to increase in evaporation of water leaving dissolved salts at the surface soil, which in turn leads to increased problem of salinity.	**5**
Increase in coast of cultivation	60 (75%)	Due to increased pest and insect attack and also due to increased diseases costs of insecticide and fertilizer have also increased to a significant level.	**2**
Increase in animal diseases	45 (56.25%)	Different types of diseases of hen, duck, animals etc. like- white faeces, spot in the body, sterility etc. has increased.	**7**
Decrease in fish growth rate	37 (46.25%)	Growth rate of fish declined mainly due to overfishing and increased saline level.	**8**
Increase in cost of fish	54 (67.5%)	Now farmers have to move towards deep sea to catch fish which increase fish cultivation the both risk and cost of fish cultivation.	**4**

ISBN: 978-93-85822-01-8

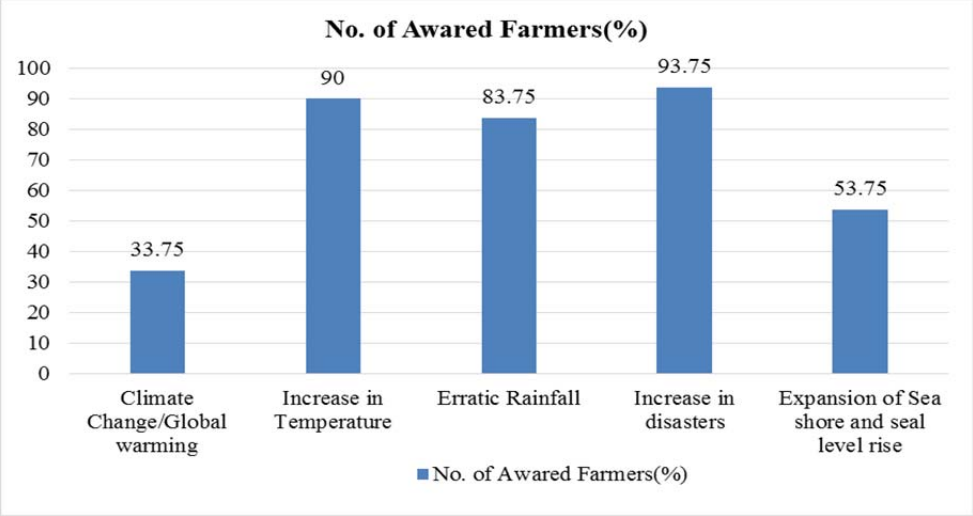
Decrease in forest area	58 (72.5%)	Area under mangrove forest has also declined due to deforestation and frequent disasters like cyclone.	**3**
Extinction of certain plants, birds and animal species	30 (37.5%)	Certain local animal and bird species has been totally vanished from that area.	**10**
Decrease in Income	22 (27.5%)	Income of the farmers has reduced due to crop loss, low production and increase in cost of cultivation.	**11**
Increase in migration of people	35 (43.75%)	Peoples are migrating towards Bhubaneswar, Kolkata, Gujarat and Delhi etc. for job and better livelihood.	**8**

Table 70: Perception on Change dynamics (N=80)

Factors	No.	Rank
Climate Change/Global warming	27 (33.75%)	**5**
Increase in Temperature	72 (90%)	**2**
Erratic Rainfall	67 (83.75%)	**3**
Increase in disasters	75 (93.75%)	**1**
Expansion of Sea shore and seal level rise	43 (53.75%)	**4**

Graphical delineation

ISBN: 978-93-85822-01-8



People by less no. do believe that there is global warming or climate change. But, people in high intensity do believe that, there has been change in temperature, increase in disasters and rainfall has developed an erratic pattern. So, global warming as rhetoric, may not be that socialized as such, but there has been a clear perception on changes of meteorological parameters.

Table 71: Perception on Adaptation (N=80)

Factors	No.	Rank
Govt. policies to mitigate climate change impact.	25 (31.25%)	**3**
Adoption as per govt. policies	15 (18.75%)	**4**
Change in sowing date	58 (72.5%)	**2**
Varietal change	63 (78.75%)	**1**

Most of the respondents have opted for change in conventional rice variety as a mitigation strategy to combat the climate change. They have also opted for change in sowing time as another highly expectable strategy. But

ISBN: 978-93-85822-01-8

interestingly, a few percent of farmers off for having a change in govt. policies.

Table 72: Threats analysis for Lake Chilika

Key threats	**Likely influence on ecological Character (C= Component, P= Process and S= Services)**	**Likelihood of changes in ecological character in near term (High Medium, Low)**
High rates of siltation Assessments of current siltation rates as well as results from analysis of sediment cores indicate that Lake Chilika is receiving elevated silt loads. Changes in land use within Chilika Basin aggravate this trend. Further fragmentation of floodplains have also led to changes to overall fluvial dynamics of the deltaic system, with the aggraded channels also being a course of silt into the lake.	Loss of water holding capacity (C) and thereby ability to regulate hydrological regimes (S)	High

ISBN: 978-93-85822-01-8

Changes in surface-water connectivity Maintaining lagoon-sea connectivity is a challenge owing to high littoral drift, basin sedimentation and tidal influence. The inlet condition is rendered unstable due to reduction in tidal prism with increasing length of the channel. While the lagoon is known to go through phases of closure of sea mouth, these changes have high implications for ecosystem service Additionally, trends indicate increasing demands for upstream water uses, which would impact spatial as well as temporal availability of water resources downstream. This is likely to induce changes in salinity regimes, with concurrent changes in biota and ecosystem services.	Changes in hydrological regimes (C), water balance (C), species migration patterns between sea-lake (P), ability to sustain fisheries (S) and regulate hydrological regimes (S)	Medium
Regional Climate change Mahanadi River Basin level climate modelling studies indicate changes in precipitation patterns, impacting temporal variability of the freshwater flow regimes. These changes will have an impact on salinity gradient, which is a key determinant for wetland biota and ecosystem services.	Changes in hydrological regimes with associated changes in several components and processes	Medium to High
Invasion of Phragmites karka Rapid increase in area under Phragmites karka is likely to enhance siltation in northern sector, stress fish breeding grounds, shift vegetation belts and create health hazards for communities.	Increased siltation in northern sector (C), stress on fish breeding grounds (P) and community livelihoods (S)	High

ISBN: 978-93-85822-01-8

Increasing tourist pressure Restoration of overall aesthetics of Chilika, post hydrological intervention has led to increased touristic pressure. Unmanaged tourism beyond carrying capacity of the wetland system would create stresses on biota (for example Irrawaddy Dolphins) and ecosystem services.	Stress on biota (C) and ecosystem services (S)	High
Increasing tourist pressure Analysis of historical trends indicates a rapid increase in number of active fishers as wail as fishing boats deployed in the wetland system. The overall catch is also hovering near the recommended sustainable yield levels. If not managed suitably, there is a high risk of overexploitation of fisheries resource, with severe impacts on community livelihoods.	Stress on biota (C) and ecosystem services (S)	High

ISBN: 978-93-85822-01-8

Continued incidence of destructive fishing practices Chilika is subject to several detrimental fishing practices which pose major threats to its sustenance. Shrimp aquaculture on the shorelines of the central, southern and outer channel impedes inundation patterns and stresses the breeding and feeding grounds of fishes and prawns. Prevalence of Khonda fisheries on migration pathways leads to loss of valuable biodiversity including juveniles which are destroyed in the process, and creates obstruction to natural recruitment. Cast net operation near now mouth is affecting broad fishes of mullets. Indiscriminate propelling of boats churn lake bottom leading to increased turbidity. Use of fish mesh seine nets in large scale throughout the lake blocks migratory routes of fish and prawns and leads to killing of juveniles. Indiscriminate shrimp post larvae collection has severe implications for biodiversity lost in the by-catch.	Stress on biota (C) and ecosystem services (S)	High
Skewed resource benefit sharing patterns The current fish marketing system prevalent in Chilika leads to higher returns to middlemen and commission agents who exploit the vulnerability of fishers to gain undue returns from the enterprise. Even with increase in efforts, the return to fishers remains insufficient with respect to livelihood needs.	Stress an biota (C) and ecosystem services (S)	Medium

ISBN: 978-93-85822-01-8