Path Analysis of Adoption of Improved Agricultural Package of Practices by Project Affected Farmers

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Abstract

The rehabilitation and resettlement of the affected population of the Sardar Sarovar Project (SSP) has become a sensitive issue and has been given the highest priority in its implementation. A rehabilitation policy has been formulated by the Government of Gujarat, the primary objective of which is to significantly improve the economic condition of the Project Affected Farmers (PAFs) after resettlement. At the rehabilitated location, PAFs are cultivating different crops. The present study was designed to measure the extent of adoption of recommended practices and find out the variables influencing the adoption of practices by Sardar Sarovar Project Affected Farmers.

Introduction

Narmada is the fifth largest river in the country and the largest west flowing river in the peninsula. Originating from Madhya Pradesh, the river flows through Maharashtra and Gujarat before joining the Arabian Sea in the Gulf of Khambhat. The Sardar Sarovar Project (SSP) on the river Narmada is one of the important projects and promises to be the new life line for Gujarat state as we enter the new millennium. It is also an interstate project in which the states of Gujarat, Madhya Pradesh, Maharashtra and Rajasthan are participating. The rehabilitation and resettlement of the affected population of the SSP has become a sensitive issue and has been given the highest priority in its implementation. A rehabilitation policy has been formulated by the Government of Gujarat for the affected population. The primary objective of the policy is to significantly improve the economic condition of the Project Affected Farmers (PAFs) after resettlement. At the rehabilitated location, PAFs are cultivating different crops like Cotton and Pigeon pea.

Keeping this in view, the present study was designed to measure the extent of adoption of recommended cotton and pigeon pea practices and find out the variables influencing the adoption of the recommended cotton and pigeon pea practices by Sardar Sarovar Project Affected Farmers.

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Methodology

The present research was undertaken purposively in five talukas of Baroda district, where a large number of PAFs were resettled. All vasahats falling under selected talukas were included in the study. Thus, a total 121 vasahats from five talukas were selected for the study. From the availability of PAFs in each vasahat of five talukas, 5 per cent of PAFs were selected through proportionate random sampling technique. Thus, a total 250 PAFs were randomly selected as respondents for the present study. Data were collected with the help of a pretested structured interview schedule.

For the present study, an attempt has been made to develop an adoption index which can scientifically measure the extent of adoption of modern recommended practices of major crops (Cotton and Pigeon pea) in the rehabilitated area. Eleven improved recommended practices of cotton and pigeon pea were selected and circulated among 25 experts associated with the Agriculture University. Keeping in mind the importance of a particular practice, they were asked to distribute 100 scores among the selected eleven practices. The weightage of the particular practice assigned by each expert was summed up and arithmetic mean was calculated and rounded of to the nearest integral figure. The adoption quotient developed by Chattopadhyay (1974) was used with a slight modification. The adoption quotient of each respondent for each of the selected practices was worked out with the help of following formula.

$$AQ=\frac{\sum(e_1/p_1)w_1+(e_2/p_2)w_2+.....+(en/pn)wn\times 100}{WN}$$

Where AQ = Adoption Quotient

$\sum$ = Summation

e_1, e_2, ...,en = Extent of adoption in terms of score obtained by the PAFs for the particular practice

p_1, p_2,.....,pn = Potential capacity of the respondent in terms of score obtained for the particular practice

w_1, w_2,....., wn = Weightage of the particular practice

W = w_1+ w_2 + -------- + wn

N = Number of years for which adoption quotient is calculated

The total score obtained by each individual was worked out and summed up. The respondents were grouped into three categories on the basis of mean and 0.5 SD, viz., low (below mean - 0.5 SD), medium (mean +/- 0.5 SD) and high (mean + 0.5 SD).

Results and Discussion

Extent of Adoption of Recommended Practices in Cotton

The distribution of the respondents according to their extent of adoption of cotton practices has been presented in Table 1 and clearly indicates that the respondents appeared to spread over all the three categories of extent of adoption of cotton practices more or less in a similar manner. Over one third (34 per cent) of the respondents were found to have high extent of adoption of cotton practices, 34 per cent were found to have medium level of extent of adoption of cotton practices followed by 32 per cent of the respondents with low level of adoption of cotton practices.

Table 1. Distribution of the respondents according to their extent of Adoption of Cotton Practices

N = 250

Sl. No.	Category	Number	Per cent
1.	Low (upto 40 score)	80	32
2.	Medium (41 to 47 score)	85	34
3.	High (above 47 score)	85	34
	Total	250	100
	Mean	43.79	
	0.5 SD	3.44	

The data reveals that there was medium to high level of adoption of cotton practices by majority (68 per cent) of the respondents. This finding is in line with that of Patel (1989).

Extent of Adoption of Recommended Practices in Pigeon Pea

The distribution of the respondents according to their extent of adoption of pigeon pea practices has been presented in Table 2.

The data presented in Table 2 reveals that nearly half (48.8 per cent) of the respondents had low level of adoption, followed by 30 and 21.2 per cent of them with high and medium level of adoption of pigeon pea practices respectively. This finding is in line with the findings of Chauhan (1994).

Table 2. Distribution of the respondents according to the extent of Adoption of Recommended Practices in Pigeon Pea

N = 250

Sl. No.	Category	Number	Per cent
1.	Low (upto 31 score)	122	48.8
2.	Medium (32 to 40 score)	53	21.2
3.	High (above 40 score)	75	30
	Total	250	100
	Mean	35.26	
	0.5 SD	4.53	

Direct and Indirect Effects of selected Independent Variables on Extent of Adoption of Recommended Practices in Cotton

Direct Effect

It is observed from the data given in Table 3 that among the sixteen selected significant independent variables, thirteen variables exhibited positive direct effect, whereas the remaining three variables had negative but direct effect on the extent of adoption of the recommended practices in cotton. Annual income had maximum positive direct effect (0.4435), followed by innovativeness (0.4079), size of family (0.2824), education (0.222), age (0.1623), material possession (0.1524), scientific orientation (0.1288), extension contact (0.1164), sources of information (0.0327), land holding (0.0296), type of house (0.0227), risk orientation (0.0224) and occupation (0.0088) respectively. The variable, attitude towards modern agriculture had maximum negative direct effect (-0.2037), followed by socio-economic status (-0.1774), and type of family (-0.1283), respectively on the adoption of cotton practices of PAFs.

Total Indirect Effect

Table 3 reveals that among the sixteen selected independent variables, thirteen variables exerted positive total indirect effect on extent of adoption, whereas three variables exerted negative indirect effect on extent of adoption of cotton practices.

Further, it can be observed that attitude towards modern agriculture had maximum positive total indirect effect (0.6517), followed by socio-economic status (0.5934), risk orientation (0.3986), material possession (0.3456), type of family (0.2693), scientific orientation (0.2642), sources of information (0.2563), annual income (0.1825), education (0.167), extension contact (0.1316), type of house (0.1213), land holding (0.0954) and innovativeness (0.0851) respectively. The variable, age had maximum negative total indirect effect (-0.5863) followed by occupation (-0.2758) and size of family (-0.1344) respectively on the extent of adoption of cotton practices.

Table 3. Direct, Total Indirect and Substantial Indirect Effect of Independent Variables on Adoption of Recommended Practices in Cotton

N = 250

Variables	Direct effects	Indirect effects	Substantial indirect effect	
			First order	Second order
X1 Age	0.1623	-0.5863	0.1574 X18	0.0248 X4
X2 Education	0.222	0.167	0.1679 X12	0.094 X15
X3 Type of family	-0.1283	0.2693	0.1756 X4	0.0867 X13
X4 Size of family	0.2824	-0.1344	0.0584 X12	0.0185 X7
X5 Type of house	0.0227	0.1213	0.0642 X12	0.0393 X7
X6 Occupation	0.0088	-0.2758	0.0219 X1	0.0172 X18
X7 Material possession	0.1524	0.3456	0.2091 X15	0.1838 X12
X8 Land holding	0.0296	0.0954	0.1507 X4	0.1369 X12
X9 Socio-economic status	-0.1774	0.5934	0.1799 X12	0.1599 X4
X10 Annual income	0.4435	0.1825	0.1281 X15	0.0841 X2
X11 Extension contact	0.1164	0.1316	0.1714 X15	0.0616 X2
X12 Sources of information	0.0327	0.2563	0.1263 X15	0.0934 X12
X13 Innovativeness	0.4079	0.0851	0.1392 X12	0.0984 X4
X14 Risk orientation	0.0224	0.3986	0.3694 X15	0.1062 X12
X15 Scientific orientation	0.1288	0.2642	0.3117 X15	0.0853 X12
X16 Attitude towards modern agriculture	-0.2037	0.6517	0.3813 X15	0.1285 X12

Further, it can be observed that attitude towards modern agriculture had maximum positive total indirect effect (0.6517), followed by socio-economic status (0.5934), risk orientation (0.3986), material possession (0.3456), type of family (0.2693), scientific orientation (0.2642), sources of information (0.2563), annual income (0.1825), education (0.167), extension contact (0.1316), type of house (0.1213), land holding (0.0954) and innovativeness (0.0851) respectively. The variable, age had maximum negative total indirect effect (-0.5863) followed by occupation (-0.2758) and size of family (-0.1344) respectively on the extent of adoption of cotton practices.

Substantial Indirect Effect

The first maximum positive substantial indirect effect was exerted by attitude towards modern agriculture (0.3813), followed by risk orientation (0.3694), scientific orientation (0.3117), material possession (0.2091), extension contact (0.1714), annual income (0.1281) and sources of information (0.1263) routed through the variable, innovativeness. On the other hand, socio-economic status (0.1799) followed by education (0.1679), innovativeness (0.1392), type of house (0.0642) and size of family (0.0584) was observed to have exercised positive substantial indirect effect through annual income. Further, it can be observed that type of family exercised

positive substantial indirect effect (0.1756) followed by land holding (0.1507) exerted through size of family. Age (0.1574) was observed to have exercised positive substantial indirect effect through attitude, while occupation (0.0219) was observed to have exercised positive substantial indirect effect through age. The second positive largest substantial indirect effect was exerted by material possession (0.1838) through annual income. It can be concluded that seven out of seventeen independent variables had their first largest substantial indirect effects through innovativeness, five variables had their indirect effects through annual income, two variables had indirect effect through size of family, two variables viz., age and education had their indirect effect through attitude towards modern agriculture and age, respectively.

In case of the second largest substantial indirect effect, six variables had their indirect effect through annual income, three variables had their indirect effect through size of family, two variables had their indirect effect through education, two variables had their indirect effect through occupation, three variables viz., occupation, education and type of family had their indirect effect through attitude towards modern agriculture, innovativeness and extension contact, respectively.

Direct and Indirect Effects of selected Independent Variables on Adoption of Recommended Practices in Pigeon Pea

Path analysis, with the inclusion of fourteen independent variables which had significant correlation, with extent of adoption of recommended practices in pigeon pea as a dependent variable, was carried out. The direct effect, total indirect effect of each of the independent variables, first indirect effect and second indirect effect channeled through other variables are presented in Table 4.

Direct Effect

The data in Table 4 reveals that ten independent variables out of fourteen variables were found to have positive direct effect, whereas remaining four variables had negative but direct effect on the extent of adoption of recommended practices in pigeon pea. Age had maximum positive direct effect (0.4768), followed by annual income (0.3787), risk orientation (0.3172), scientific orientation (0.3042), attitude towards modern agriculture (0.1988), socio-economic status (0.1913), land holding (0.1334), sources of information (0.1326), type of house (0.0418) and animal possession (0.0388) respectively. The variable, material possession had maximum negative direct effect (-0.2452), followed by extension contact (-0.1249), education (-0.1235) and innovativeness (-0.1026) respectively, on the extent of adoption of pigeon pea practices of PAFs.

Table 4. Direct, Total Indirect and Substantial Indirect Effect of Independent Variables on Adoption of Pigeon pea Practices

Variables	Direct effects	Indirect effects	Substantial indirect effect	
			First order	Second order
X1 Age	0.4768	-0.7418	0.0348 X13	0.0387 X15
X2 Education	-0.1235	0.3365	0.173 X12	0.0731 X16
X6 Type of house	0.0418	0.1972	0.0955 X12	0.0919 X12
X8 Animal possession	0.0388	0.1362	0.1573 X12	0.0310 X11
X9 Material possession	-0.2452	0.5912	0.1936 X12	0.1627 X16
X10 Land holding	0.1334	0.0156	0.2321 X12	0.0968 X11
X11 Socio-economic status	0.1913	0.1387	0.0675 X10	0.0567 X16
X12 Annual income	0.3787	0.0233	0.0996 X16	0.0818 X10
X13 Extension contact	-0.1249	0.2649	0.1333 X16	0.1307 X17
X14 Sources of information	0.1326	0.0264	0.1078 X17	0.0982 X16
X15 Innovativeness	-0.1026	0.3936	0.2755 X17	0.1519 X18
X16 Risk orientation	0.3172	-0.2859	0.2843 X17	0.1510 X18
X17 Scientific orientation	0.3042	-0.0332	0.2966 X16	0.1767 X18
X18 Attitude towards modern agriculture	0.1988	0.0812	0.2704 X17	0.241 X16

Total Indirect Effect

Among the fourteen selected independent variables, eleven variables exhibited positive total indirect effect on extent of adoption, whereas three variables exerted negative indirect effect on extent of adoption of pigeon pea practices.

Further, it can be observed that material possession had maximum positive total indirect effect (0.5912), followed by innovativeness (0.3936), education (0.3365), extension contact (0.2649), type of house (0.1972), socio-economic status (0.1387), animal possession (0.1362), attitude towards modern agriculture (0.0812), sources of information (0.0264), annual income (0.0233) and land holding (0.0156) respectively. The variable, age had maximum negative total indirect effect (-0.7418) followed by risk orientation (-0.2859) and scientific orientation (-0.0332), respectively on the extent of adoption of pigeon pea practices.

Substantial Indirect Effect

The first maximum positive substantial indirect effect was exerted by scientific orientation (0.2966), followed by extension contact (0.1333) and annual income (0.0996) routed through the variable. On the other hand, risk orientation (0.2843), followed by innovativeness (0.2755), attitude towards modern agriculture (0.2704) and sources of information (0.1078) were observed to have exerted positive substantial indirect effect through scientific orientation. It can be observed that land

holding had positive substantial indirect effect (0.2321) followed by material possession (0.1936), education (0.1730) and animal possession (0.1573) exerted through annual income. Further, it can be observed that type of house (0.0955), socio-economic status (0.0675) and age (0.0348) were observed to have exerted positive substantial indirect effect through education, land holding and extension contact, respectively. The second positive largest substantial indirect effect was exerted by attitude towards modern agriculture (0.2410) through risk orientation.

It can be concluded that three out of fourteen independent variables had their first largest substantial indirect effects through risk orientation, four variables had their indirect effects through scientific orientation, four variables had their indirect effects through annual income, three variables viz., type of house, socio-economic status and age had their indirect effects through education, land holding and extension contact, respectively.

In case of the second largest substantial indirect effect, five variables had their indirect effects through risk orientation, three variables had their indirect effects through attitude towards modern agriculture, two variables had their indirect effects through socio-economic status, four variables viz., extension contact, type of house, annual income and age had their indirect effects through scientific orientation, annual income, land holding and innovativeness respectively.

Conclusion

It can be concluded from the above results that path analysis showed that among the sixteen selected significant independent variables, thirteen variables i.e. annual income, innovativeness, size of family, education, age, material possession, scientific orientation, extension contact, sources of information, land holding, type of house, risk orientation and occupation had exhibited positive direct effect, whereas the remaining three variables i.e. attitude towards modern agriculture, socio-economic status and type of family had negative but direct effect on the extent of adoption of cotton practices of PAFs. In case of adoption of pigeon pea practices, out of fourteen selected significant independent variables, the ten variables i.e. age, annual income, risk orientation, scientific orientation, attitude towards modern agriculture, socio-economic status, land holding, sources of information, type of house and animal possession, were found to have positive direct effect, whereas the remaining four variables like material possession, extension contact, education and innovativeness had negative but direct effect on the extent of adoption of pigeon pea practices of PAFs. Hence, these are the crucial variables as far as adoption of cotton and pigeon pea cultivation practices of PAFs is concerned.

References

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