

ADOPTION OF IMPROVED AGRICULTURAL PRACTICES OF FARMERS

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The research reported in this paper investigated adoption of improved practices as a function of socio-economic characteristics of farmers. Data were obtained from a group of 172 farmers in a Community Development Block of Delhi State. It was observed that some of the socio-economic characteristics considered in this study, *viz.*, farm size, economic status, social participation and education, were associated with adoption of improved practices and that they functioned in a definite direction leading to the adoption of recommended practices. This suggests that cultivators should be stratified according to broad socio-economic groups indicating responsiveness to extension contacts and working with selected groups may then yield higher returns for extension effort expended.

THE PROBLEM

One of the problems facing agricultural development in this country is the astonishingly low level of adoption by farmers of improved agricultural practices. The various reasons attributed to the low level of adoption are economic, social and psychological factors, and those connected with the farm and the practice in question. This paper

presents the results of an attempt to find out the socio-economic factors that are associated with adoption of improved agricultural practices among farmers, studied in an Indian situation. There is considerable agreement in countries, such as United States regarding the relationship between socio-economic factors and adoption. With a few exceptions, these studies¹ have found that farm ownership, education, size of farm, income and social participation are positively associated with adoption of improved practices. The findings with respect to age, as a factor influencing adoption, were inconclusive. Since the study in this direction is limited in India, it was carried out firstly to find out the nature and degree of relationship between various socio-economic factors and adoption and secondly to see whether any differences exist in the average adoption of different categories of farmers according to their socio-economic characteristics. With this view the following null-hypotheses were formulated.

- (1) There are no significant differences in the average adoption between different categories of farmers, according to their socio-economic characteristics.

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¹Report of the Sub-committee on the Diffusion and Adoption of Farm Practices. The Rural Sociological Society, "Sociological Research on the Diffusion and Adoption of new Farm Practices, "Kentucky Agl. Expt. Sta., Univ. of Kentucky, Dept. Ru. Soc. 1952".

(2) (a) There is no significant relationship between adoption of improved practices and socio-economic factors.

(b) There is no significant relationship between adoption of improved practices and any one of the socio-economic factors when the effects of other factors are eliminated.

Methodology.—Data were collected from Khanjawala Community Development Block in Delhi State. A random sample of three villages was selected from the Block as a whole. All the owner farmers in three selected villages were enumerated and interviewed, yielding a total of 172 interviews. The data were collected through the interview schedule method.

Eight improved practices recommended by extension agency were included in this study. The criteria employed for the selection of practices were (1) the practice selected should concern most farmers of the area; (2) the practice should be objectively measurable; and; (3) it should have been possible for the adoption of the practice to take place within a reasonable time period. Eight practices conforming to the above criteria were selected. These were improved varieties of wheat and bajra (*pennisetum typhoides*), composting of manure in pits, green manuring, mould-board plough, olpad wheat thresher, use of plant protection measures and 2,4-D sprays for the control of weeds in the wheat crop.

The measure of adoption used in the study was the index of adoption which is given by the number of practices adopted by a farmer out of eight improved practices. Each practice was credited with a unit point. The farmers were grouped into three high (Low adoption index 0-2; Medium

adoption index 3-5; High adoption index 6 and over). No attempt is made here to discuss the adoption of individual practices.

The socio-economic characteristics covered in this study were farm size, economic status, social participation, education and age.

The measure of economic status employed in this study was the index of economic status based upon relative scores with respect to five separate items. These were: area of land owned, number and type of livestock owned, number of implements possessed, type of housing and tangible evidence of the farmers' economic status by way of possession of certain material things. Each of these 'items' were credited with suitable scores. (a) Land = 3 points per acre; (b) Livestock = Draught cattle = 3 points per pair; milch cattle = 3 points per head; Camel = 3 points, Goat or Sheep = 1 point per head; separate cattle shed = 1 point (c) implements: olpad thresher = 3 points; iron plough, mechanical chaff cutter and cultivator = 2 points each; bullock cart = 3 points (d) cowdung gas plant = 3 points; Radio = 3 points,; Cycle = 2 points (e) Pacca house = 3 points, kuchha house = 1 point, mixed = 2 points. Total score obtained by a farmer with respect of these items was taken to indicate his economic status. On the basis of these scores, farmers were divided into three groups viz. low economic status score 0-35; medium economic status score 36-65; high economic status score 65 and above.

For the purpose of this study a scale was developed and used to measure social participation. It was based on the scale formulated by Hay (1951)² and necessary modifications were made therein to suit local conditions. The definition of social

²Hay, D. G. "Social participation of individuals in rural communities of north east", *Rural Sociology*, 16 (1951): 127-136.

participation given by Hay (1948)³ served as basic orientation. He defined social participation as, "the voluntary sharing in person to person and group to group relationship beyond the immediate households." Panchayats (local self governing bodies) and cooperatives were included in formal organizations. Scores of 0, 1, 2 and 3 have been given for non-membership, membership, taking part in discussions and holding an office respectively in formal organizations. In respect of informal activities included in this study scores and 1 and 2 were given for attendance and contributions respectively. Total score obtained by an individual was taken as the index of his social participation. Based on these scores, farmers were classified into three social participation categories viz. low social participation score 1-3; medium 4-6; high 7 and above. The farmers were also classified on the basis of farm size, age and education.

Two types of statistical tests were employed in this study to test the hypothesis. To test the first hypothesis analysis of variance (F-test) was applied to find out the significant differences between different categories of each of the five socio-economic factors. The differences in the average adoption index between different categories of socio-economic factors were tested by means of t-test. Only those factors showing significant relationship with adoption were included in the t-test.

The t-test for testing the significance of correlation and regression coefficients was applied to test the second hypothesis. The simple correlation coefficient of each of

independent variables was estimated to ascertain the relationship between adoption and other variables. Partial correlation coefficient of adoption with socio-economic factors (economic status, farm size, and social participation) was worked out to study the relationship between adoption and any one of the factors, when the effect of other two factors was kept constant. Those factors showing significant relationship with adoption were retained in multiple correlation and regression analysis. These were farm, size, economic status and social participation.

To judge the contribution of these three factors, to the variability in the dependent variable, multiple regression equations were fitted with adoption as dependent variable and the socio-economic factors as independent variables. The regression equations relating to adoption with farm size and economic status, and adoption with economic status and social participation were also fitted to see the contribution of two of these factors at a time with economic status as one of the factors. In all the cases significance of regression coefficients was tested against their standard errors calculated with the help of corresponding 'C values.

The results are discussed below.

ANALYSIS

The results of analysis of variance are presented in table 1. They show that the effects of socio-economic factors, such as farm size, economic status, education and social participation, with the exception of age, are highly significant.

³Hay, D. G. "Scale for the measurement of social participation of rural households." *Rural Sociology*, 16 (1948): 285-294.

TABLE 1
ANALYSIS OF VARIANCE OF VARIOUS SOCIO-ECONOMIC VARIABLES

No.	Source of variation	D.F.	S.S.	M.S.	F.
1.	Farm size	2	286.59	143.29	70.24**
	within error	169	346.26	2.04	
2.	Economic status	2	287.18	143.95	70.20**
	within error	169	345.67	2.04	
3.	Age	2	8.58	4.29	1.55
	within error	169	624.26	3.71	
4.	Education	3	90.34	30.11	9.325**
	within error	168	524.51	3.32	
5.	Social participation	2	251.86	125.93	55.86**
	within error	169	380.99	2.25	

(**Significant at 1% level).

The differences in the average adoption index between different socio-economic categories were analysed. The results are presented in table 2. It was observed that there was no significant difference between the adoption indices of low and medium sized farms, while the differences in the average adoption indices of low and large sized farms and large and medium sized farms were highly significant. The differences in the average adoption indices of low, medium and large categories according to economic status and social participation were highly significant. Regarding education there were highly significant differences in

average adoption indices between illiterate and literate farmers, while there were no significant differences among literate farmers with different levels of education. It clearly shows that while education plays an important part in making the farmers accept new practices, the level of education has not been of much importance. This may be perhaps due to the fact, that most of the practices included in this study with the exception of a few, require only a little understanding and further they were not selected on the basis of literacy levels. Hence the data do not reveal significant differences in adoption between different levels of education.

TABLE 2
EFFECT OF VARIOUS SOCIO-ECONOMIC FACTORS ON ADOPTION OF IMPROVED FARM PRACTICES

Socio-economic variables	No. of farmers	Total adoption	Average adoption Index	Difference between	S.E.d	t
Farm size—						
1. Low	38	70	1.84	(1-2)=0.522	0.277	1.875
2. Medium	89	211	2.36	(1-3)=3.27	0.222	14.708**
3. Large	45	230	5.11	(2-3)=2.75	0.261	10.505**
Economic status—						
1. Low	67	117	1.74	(1-2)=1.07	0.254	4.212**
2. Medium	60	169	2.81	(1-3)=3.26	0.275	11.828**
3. High	45	225	5.00	(2-3)=2.19	0.231	7.769**
Education—						
1. Illiterate	67	148	2.2	(1-2)=0.9	0.309	2.911**
2. Can read, write	68	210	3.1	(1-3)=2.0	0.427	4.681**
3. Upto primary	24	101	4.2	(1-4)=1.8	0.290	6.202**
4. Above primary	13	52	4.0	(2-3)=1.1	0.426	2.58*
				(2-4)=0.9	0.543	1.65
				(3-4)=0.2	0.618	0.328
Social participation—						
1. Low	52	69	1.32	(1-2)=1.90	0.267	7.105**
2. Medium	80	259	3.22	(1-3)=3.28	0.315	10.389**
3. High	40	184	4.60	(2-3)=1.38	0.290	4.747**

**Significant at 1% level.

*Significant at 5% level.

From the above findings the following conclusions can be drawn regarding the first hypothesis:

(i) There were significant differences in the average adoption index of different categories according to farm size, economic status, and social participation.

(ii) There were significant differences in the average adoption index of literate and illiterate farmers. But within literate categories there were no significant differences.

The results of estimating the correlation of adoption with individual socio-economic factors and the relationships among the factors are presented in table 3. The results show that there is a highly significant and positive correlation between adoption and each of the socio-economic factors such as farm size, economic status, and social participation. The factors of age and education have no significant correlation with adoption.

TABLE 3
SIMPLE CORRELATION COEFFICIENTS AND THEIR SIGNIFICANCE

	Adoption	Farm size	Economic status	Age	Education	Social participation
Adoption		.663**	.732**	.142	.130	.666**
Farm size	.663**	.6	.523**	.017	.071	.532**
Economic status	.732**	.523**		.231	-.011	.633**
Age	.142	.017	.231		-.120	.231
Education	.130	.071	-.011	-.120		.151
Social participation	.666**	.532**	.633	.231	.151	

**Significant at 1% level.

The results of estimating the partial correlation coefficients between adoption and socio-economic factors (farm size, economic status and social participation) are presented in table 4. The relationships between adoption and farm size, adoption and economic status and, adoption and social participation are positive and significant when the effects of other two factors are kept constant.

In order to test the hypothesis of relationship between adoption and socio-economic factors it was necessary to compute multiple correlation coefficients between adoption and all the three independent variables showing significant correlation with adoption. Also regression coefficients were worked out to

see the contribution of each of these factors and corresponding β values (standard regression coefficients) were computed to see which of these factors are more important. The results are presented in table 4. The multiple correlation value .785 is significant at 1% level. It indicates that these three factors together have a significant and positive relationship with adoption. Though the farm size by itself shows a significant and positive relationship with adoption, in the presence of other factors it shows a negatively significant contribution to adoption. The standard regression coefficients indicate that economic status is most important followed by social participation and farm size.

TABLE 4
SIGNIFICANCE OF PARTIAL CORRELATION AND REGRESSION COEFFICIENTS OF ADOPTION WITH THREE FACTORS (FARM SIZE, ECONOMIC STATUS, AND SOCIAL PARTICIPATION).

	b	SEb	t	β	Partial correlation coefficients
Farm size	-.165	.060	2.744**	.695	.423 R ² = .6170
Economic status	.081	.018	4.415**	1.397	.481 R = .785**
Social participation	.205	.055	3.724**	.328	.281

**Significant at 1% level.

The results of multiple correlation and regression of adoption with farm size and economic status are presented in table 5. The multiple correlation value .765 is significant at 1% level. As in the previous

table farm size has shown negatively significant relationship with adoption in the presence of economic status. Standard regression coefficients indicate a similar trend as in the previous case.

TABLE 5

SIGNIFICANCE OF REGRESSION COEFFICIENTS WITH TWO FACTORS (FARM SIZE, ECONOMIC STATUS).

	b	SEb	t	β			
Farm size	-.276	.0558	4.946**	-.149	R ²	=	.5862
Economic status	.121	.015	7.780**	2.090	R	=	.765**

**Significant at 1% level.

The results of multiple correlation of adoption with economic status and social participation are presented in table 6. Multiple correlation value .774 is significant at 1% level showing a high relationship of

these two factors with adoption. Standard regression coefficients reveal that economic status is more important than social participation.

TABLE 6

SIGNIFICANCE OF REGRESSION COEFFICIENTS WITH TWO FACTORS (ECONOMIC STATUS, SOCIAL PARTICIPATION)

	b	SEb	t	β			
Economic status	.031	.003	8.364**	.546	R ²	=	.5995
Social participation	.276	.050	5.458**	.440	R	=	.774**

**Significant at 1% level.

From the above data the following conclusions can be drawn regarding the second hypothesis.

(i) There is a significant and positive relationship between adoption and any one of the socio-economic factors such as farm size, economic status and social participation.

(ii) There is a significant relationship between adoption and the three factors viz., economic status, farm size and social participation and their contribution is to the extent of 61.7%.

(iii) Any two of the three factors, with economic status as one of them are sufficient to bring about adoption. The contribution of two factors, economic status and farm

size is 58.6% and economic status and social participation is 59.9% which is only slightly less than the contribution of three factors together. It is, therefore, sufficient to use two factors, economic status and social participation for prediction.

(iv) Economic status is more important followed by social participation and farm size.

SUMMARY AND CONCLUSION

The analysis of data showed that some selected socio-economic characteristics of farmers such as farm size, economic status and social participation have a positively significant relationship with adoption. It also revealed that the contribution of any two of these factors with economic status as one of

them is as good as three factors taken together. Also there were significant differences in the average adoption indices of farmers when they were classified into different categories according to their socio-economic characteristics.

The finding, that farm size in the presence of other factors shows a negatively significant contribution to adoption, tends to suggest that financial subsidies and assistance are essential for promoting adoption of improved practices. Also observations made during field work lend support to this view. Because, farm size by itself is not so much as influential a factor as farm size supported by general financial capacity to go in for new techniques of production.

The finding that adoption is associated with large farms and better economic status has some implications for agricultural extension work. It should serve as a pointer to extension planners who should try to stratify the cultivators according to broad socio-economic groups indicating responsiveness to extension contacts and working with selected groups may then yield higher returns for extension effort. The observation that there is no difference in average adoption between low and medium sized farms, while there is a significant difference in the average adoption between low and large, and, medium and large sized farms requires further consideration.

The finding that there is no significant difference in the average adoption between different literacy groups needs some explanation. It is probably concerned with the nature of the practices. The practices included in this study were not selected on the basis of literacy. Most of the practices

required only a little understanding on the part of the farmer. Therefore, while education by itself had some influence on adoption, the level of education had no bearing as far as this sample of farmers was concerned for the practices studied. This suggests the importance for and need for intensive literacy drive in rural areas. For further studies of this nature it will be useful to select practices on the basis of ease or difficulty of understanding and relate it to adoption.

The implication of (a) highly significant correlation between social participation and adoption, (b) significant differences in the average adoption between different categories of social participation are more important. While higher socio-economic status may be the cause as well as the result of adoption of improved technology in agriculture, social participation tends to be more a cause of adoption rather than the result. Therefore, if efforts are made to secure more and active participation of farmers in various formal and informal activities, it is possible to get more of improved technology accepted by farmers. Since efforts in the direction of improving economic conditions through land reforms such as consolidation of uneconomic units into viable economic units, take their own time, the extension worker can capitalise on social participation and use it as a lever to secure diffusion and adoption of improved practices. Further studies of this nature, which focus on whether social participation is the cause or result of adoption and nature of participation of adopters and non-adopters will be of value to extension workers. Also there could be some interesting studies made on the possible ways in which social participation influences adoption.