Techno-economic Change among the Beneficiary Farmers of Participatory Irrigation Management Society of Mehsana District of Gujarat State

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ABSTRACT

The Mehsana District of Gujarat state was purposively selected for the study. Among the seven talukas of the district three talukas viz., Visnagar, Vijapur and Vadnagar were leading talukas for participatory activities carried out by the irrigation department and other institutions. For the selection of talukas, villages/PIMS and respondents, multistage random sampling technique was employed. Total 200 respondents from 20 selected PIMS were selected using proportionate random sampling techniques. The data were collected by personal interview. Based on the finding of the study, a great majority of the beneficiary farmers were found medium to high techno-economic change. The variables viz., *education, caste, social participation, socio-economic status, occupation, size of land holding, cropping intensity, annual income, economic motivation, scientific orientation, risk-preference, attitude towards PIMS, knowledge of recommended water management practices, contact with extension agency and utilization of information sources were positively and significantly associated with techno-economic change. Multiple regression analysis indicated that all variables exerted as much as 73.12 per cent of total variation in techno-economic change. The result of stepwise regression analysis indicated that 72.12 per cent of the total variation in techno-economic change was accounted by a set of three variables* viz., *utilization of information sources, attitude towards PIMS and knowledge of recommended water management practices. Results of path analysis inferred that out of 15 variables analysed 9 variables exerted direct positive effect and 6 variables expressed direct negative effect.*

Key words: Beneficiary farmers; Knowledge; Water management practices; Information sources

Since 1985 Ministry of Water Resources has been inspiring farmers' participation in water distribution and management of tertiary system in the projects covered under the Centrally Sponsored Command Area Development Programme. The concept of involvement of farmers in management of the irrigation system has been accepted as a policy of the Government of India and has been included in the National Water Policy adopted in 1987.

The Gujarat Government had enacted the Gujarat Water Users Participatory Irrigation Management Act, 2007. Gujarat has been giving high priority to PIM and has been systematically promoting, it by facilitating through Government resolutions from time to time since 1980. So far, 576 number of Water User Associations (WUAs) covering an area of 96680 ha. The implementation of PIM in Sabarmati Reservoir Project on June 1st, 1995 by Government of Gujarat. The Sabarmati Reservoir Project is one of the major irrigation projects in North Gujarat. The Sabarmati Reservoir Project comprises of two stages, the first (the major one) served by the Sabarmati Right Bank Minor Canal (SRBMC) and second stage is Sabarmati Left Bank Minor Canal (SLBMC). The Sabarmati Reservoir Project covers area under irrigation in Mehsana and Sabarkantha Districts is 48,105 ha. and 12,980 ha., respectively. The total area under irrigation in the project is 61,085 ha.

Though, Participatory Irrigation Management is an accepted concept for the country, but the operationalisation of this concept in a systematic manner has been a major weakness since last two decades. Through this PIMS, it would be assumed that by adopting water management practices and management system of PIMS, there should be techno-economic change and extent of adoption of recommended water management

practices among the members of PIMS. Hence there is an urgent need to study the Techno-economic change among the beneficiary farmers of Participatory Irrigation Management Society.

Objectives:

1. To measure the techno-economic change among the members of PIMS
2. To ascertain relationship between selected independent variables and techno-economic change among the members of PIMS
3. To know the direct and indirect effect of the independent variables on techno-economic change among the members of PIMS

METHODOLOGY

The Mehsana District of Gujarat state was purposively selected for the study as the district has taken lead in introducing PIMS in the state. Among the seven talukas of the district three talukas *viz.*, Visnagar, Vijapur and Vadnagar were leading talukas for participatory activities carried out by the irrigation department and other institutions. For the selection of talukas, villages/PIMS and respondents, multistage random sampling technique was employed. Total 200 respondents from 20 selected PIMS were selected using proportionate random sampling method. In this study the resultant changes occurred among the respondents in the form of techno-economic changes was taken in to account as impact of PIMS .It is operationally defined as the resultant changes during last five years due to membership of PIMS. The techno-economic change was measured in terms of changes *viz.*, increase in area, change in land use, increase in cropping intensity, change in cropping pattern, increase in crop production and change in self-sufficiency. For the collection of data field survey by personal contact using structured schedule was used. The data were collected, coded, classified, tabulated and analysed in order to get meaningful findings.

RESULTS AND DISCUSSION

A perusal of data in Table 1 reveal that more than half (58.00 per cent) of the beneficiary farmers of PIMS were found in medium category of techno-economic change. It is worth to note that 25.00 per cent of the beneficiary farmers of PIMS were found in high category of techno-economic change. The 17.00 per cent of beneficiary farmers of PIMS found in low techno-economic change.

Table 1. Distribution of the respondents according to their level of techno-economic changes (n = 200)

S. No.	Level of techno-economic changes	Frequency	%
1.	Low (Below 12.453 scores)	34	17.00
2.	Medium (12.453 to 20.657 scores)	116	58.00
3.	High (Above 20.657 scores)	50	25.00
	Total :	200	100.00

Mean = 16.555 S.D. = 4.102

It can be concluded that a great majority (83.00 per cent) of the beneficiaries of PIMS were belonged medium to high techno-economic change.

This might be due to the fact that respondents got maximum benefits of efficient use of canal irrigation water through PIMS, better contact with extension agencies, highly favourable attitude, and medium level of knowledge and adoption of management practices.

Table 2. Relationship of independent variables with techno-economic changes (n = 200)

S. No.	Independent variables		Correlation coefficient('r')
[I]	Personal :		
1.	Age	(X1)	-0.0736^{NS}
2.	Education	(X2)	0.3731**
3.	Caste	(X3)	0.1928**
[II]	Social :		
1.	Social participation	(X4)	0.3280**
2.	Socio-economic status	(X5)	0.7093**
[III]	Agro-economic :		
1.	Occupation	(X6)	0.6487**
2.	Cropping intensity	(X7)	0.1952**
3.	Size of land holding	(X8)	0.6586**
4.	Annual income	(X9)	0.7373**
5.	Credit orientation	(X10)	-0.0015^{NS}
[IV]	Psychological :		
1.	Economic motivation	(X11)	0.5503**
2.	Risk-preference	(X12)	0.5200**
3.	Scientific orientation	(X13)	0.5541**
4.	Attitude toward PIMS	(X14)	0.6243**
5.	Knowledge of recommended water management practices	(X15)	0.5407**
[V]	Communicational :		
1.	Contact with extension agency	(X16)	0.7979**
2.	Utilization of information sources	(X17)	0.8377**

NS = Non-Significant;

* Significant at 0.05 per cent level of significance;

** Significant at 0.01 per cent level of significance.

It is evident from the data presented in Table 2 that the variables *viz.*, education, caste, social participation, socio-economic status, occupation, size of land holding, cropping intensity, annual income, economic motivation, scientific orientation, risk-preference, attitude towards PIMS, knowledge of recommended water management practices, contact with extension agency and utilization of information sources were positively and significantly associated with techno-economic change. While, age and credit orientation were having negative and non-significant correlation with techno-economic change.

Table 3. Multiple regression analysis of independent variables with techno-economic changes (n = 200)

S. No.	Variables	Regression Co-efficient (bi)	S.E. of (bi)	't' value
[I]	Personal :			
1.	Age	-0.0208	0.0222	-0.9369
2.	Education	-0.0839	0.7055	-0.1189
3.	Caste	0.0959	0.6961	0.1377
[II]	Social :			
1.	Social participation	0.2957	0.7503	0.3941
2.	Socio-economic status	-0.1180	0.6691	-0.1763
[III]	Agro-economic :			
1.	Occupation	0.3637	0.7939	0.4581
2.	Cropping intensity	0.0016	0.0021	0.7619
3.	Size of land holding	0.2617	0.7761	0.3371
4.	Annual income	0.0003	0.0008	0.3750
5.	Credit orientation	0.0256	0.0706	0.3626
[IV]	Psychological :			
1.	Economic motivation	0.0005	0.7530	0.0006
2.	Risk-preference	-0.0084	0.0864	-0.0972
3.	Scientific orientation	-0.1445	0.0894	-1.6163
4.	Attitude toward PIMS	0.0568	0.0258	2.2015*
5.	Knowledge of recommended water management practices	0.0436	0.0244	1.7868
[V]	Communicational :			
1.	Contact with extension agency	0.0286	0.0811	0.3526
2.	Utilization of information sources	0.5340	0.0857	6.2310**

* Significant at 0.05 per cent level of probability.
** Significant at 0.01 per cent level of probability.
Multiple R = 0.8551 R2 = 0.7312

It can be concluded from Table 3 that 73.12 per cent total variation in techno-economic change was explained by a set of 17 independent variables together. Further, out of 17 variables, two variables *viz.*, utilization of information sources and attitude towards PIMS had significant contribution in techno-economic change. This study provided evidence about the overwhelmingly important role of two significant variables played in techno-economic change.

It is also clear from Table 4 that the variable, utilization of information sources alone accounted 70.17 per cent variation in techno-economic change, followed by utilization of information sources + attitude towards PIMS (71.52 per cent) and utilization of information sources + attitude towards PIMS + knowledge of recommended water management practices (72.12 per cent).

The data in the Table 5 indicate the Results of path analysis inferred that out of 15 variables analysed 9 variables exerted direct positive effect and 6 variables expressed negative direct effect. The variables *viz.*, utilization of information sources, attitude towards PIMS and knowledge of recommended water management practices, and showed highest positive direct effect. With respect to highest indirect positive effect on techno-economic change, the key variables were contact with extension agency, socio-economic status and annual income, while in case of first substantial effect all above variables were important and found affecting through variable utilization of information sources.

Table 4. Stepwise variation accounted by selected independent variables in techno-economic change (n=200)

Sr. No.	Independent variables	Multiple R	Total variation accounted R^2	Variation between step
1.	Utilization of information sources (X_{17})	0.8377	0.7017 (70.17 %)	70.17
2.	Attitude toward PIMS (x_{14}) + x_{17}	0.8457	0.7152 (71.52 %)	01.35
3.	Knowledge of recommended water management practices (x_{15}) + x_{14} + x_{17}	0.8492	0.7212 (72.12 %)	00.60

Table 5. The direct, total indirect and substantial indirect effects on independent variables on techno-economic changes (n = 200)

S. No.	Variables	Direct effect	Total indirect effect	Substantial indirect effect (First)
1.	**(X2)** Education	-0.0513	0.4244	0.2575 **(X17)**
2.	**(X3)** Caste	-0.0009	0.1937	0.1335 **(X17)**
3.	**(X4)** Social participation	0.0227	0.3053	0.2256 **(X17)**
4.	**(X5)** Socio-economic status	-0.0048	0.7141	0.4985 **(X17)**
5.	**(X6)** Occupation	0.0473	0.6014	0.4449 **(X17)**
6.	**(X7)** Cropping intensity	0.0316	0.1636	0.1166 **(X17)**
7.	**(X8)** Size of land holding	0.0332	0.6253	0.4811 **(X17)**
8.	**(X9)** Annual income	0.0532	0.6841	0.5162 **(X17)**
9.	**(X11)** Economic motivation	-0.0009	0.5512	0.3806 **(X17)**
11.	**(X12)** Risk preference	-0.0050	0.5249	0.3528 **(X17)**
11.	**(X13)** Scientific orientation	-0.0954	0.6495	0.4136 **(X17)**
12.	**(X14)** Attitude toward PIMS	0.1420	0.4823	0.4031 **(X17)**
13.	**(X15)** Knowledge of recommended water management practices	0.0921	0.4486	0.3469 **(X17)**
14.	**(X16)** Contact with extension agency	0.0430	0.7549	0.5746 **(X17)**
15.	**(X17)** Utilization of information sources	0.6306	0.2071	0.0907 **(X14)**

Multiple R = 0.8549; R^2 = 0.7310.

CONCLUSION

1. A great majority (83.00 per cent) of the beneficiary farmers were found medium to high techno-economic change
2. The variables *viz.*, education, caste, social participation, socio-economic status, occupation, size of land holding, cropping intensity, annual income, economic motivation, scientific orientation, risk-preference, attitude towards PIMS, knowledge of recommended water management practices, contact with extension agency and utilization of information sources were positively and significantly associated with techno-economic change. While, age and credit orientation were having negative and non-significant correlation with techno-economic change.
3. Multiple regression analysis indicated that all variables exerted as much as 73.12 per cent of total variation in techno-economic change. The result of stepwise regression analysis indicated that 72.12 per cent of the total variation in techno-economic change was accounted by a set of three variables *viz.*, utilization of information sources, attitude towards PIMS and knowledge of recommended water management practices.
4. Results of path analysis inferred that out of 15 variables analysed 9 variables exerted direct positive effect and 6 variables expressed negative direct effect. The variables *viz.*, utilization of information sources, attitude towards PIMS and knowledge of recommended water management practices, and showed highest positive direct effect. With respect to highest indirect positive effect on techno-economic change, the key variables were contact with extension agency; socio-economic status and annual income, while in case of first substantial effect all above variables were important and found affecting through variable utilization of information sources.

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