Psycho-social Factors as Correlates of Weather Forecast Decision Making Behaviour among Farmers in Andhra Pradesh.

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ABSTRACT

The purpose of this study is to explore the relationship between decision making behaviour of farmers with their different demographic and psychosocial variables taking into cognizance the information regarding weather forecasts. Decision making with respect to agricultural weather forecasting in the present study is the process of choosing the best alternative for the purpose of attaining specific goals involving the resources, environment, economic and personal characteristics of a farmer. Decisions imply the production decisions taken by farmers taking into cognizance the existing weather and information regarding future weather. The study was carried out in Ananthapur, Rangareddy and Visakhapatnam districts of Andhra Pradesh state with a sample of 180 farmers as respondents. A draft interview schedule with scales, tests etc. for measuring the variables of the study was first developed and pre-tested before data collection. The psychosocial variables (independent variables) numbering 16 were identified as likely predictors of decision making behaviour (dependent variable) of farmers. Correlation and multiple linear regressions were employed to analyze and interpret the data. Regression analysis showed that extension contact, farm size, weather knowledge, innovativeness, achievement orientation and risk orientation contributed positively and significantly towards decision making behaviour. The relative importance of these factors reflects both internal environment and external social relations of farmers that pave way for collective nature of decision making attitude. Results are discussed in terms of their implications for future development of decision-support systems and technology transfer activities to farmers for better adoption of weather forecasts.

Key words: Decision making attitude; Weather forecast; Risk orientation;

Demographic and situational variables are important because they influence the goals of farmers and their adoption of an innovation. Weather is the dominant factor determining the success or failure of agricultural enterprises. *A*ny abnormalities in weather during the season, such as delay in onset of rains, untimely or excessive rains, droughts or spells of too high or too low temperatures, would seriously affect the growth and yield of the crops. *Conway et al. (2005)* reported extreme climate events such as floods and droughts, or slow changes in climate, such as reduced rainfall or less predictability in the seasons, affect both human and natural systems and the interactions between them. Weather and climate form the biggest production risks impacting agricultural production. The effective use of weather forecasts is influenced by the decision capacity of the farmers. The common decisions that farmers and extension personnel indicate that might be adjusted in response to credible forecasts were field preparation, crop choice or area of each crop, choice of crop varieties, crop management and marketing.

The responsiveness of farmers to forecasts depends very much on the socio-economic and political circumstances, local infrastructure and the agricultural system in question. According to *Hammer (2000)*, to clearly identify their decision points it is helpful to classify them according to geographic scale and information needs. Studies with selected farm managers by *Meinke* and *Hochman (2000)* in Queensland indicate that by identifying decisions that positively influence the overall farm operation in either economic or environmental terms, these farmers have gained a better understanding of the system's vulnerability and started to 'climate proof' their operations. Examples for actions taken when a forecast is for 'likely to be drier than normal' are: maximizing no-till area (water conservation), applying nitrogen fertilizer early to allow planting on stored soil moisture at the most appropriate time; planting most wheat later than normal to reduce frost risk. In seasons that are likely to be wetter

than normal, management options include: sowing wheat earlier; applying nitrogen to a wheat cover crop grown on a dry profile after cotton (normally not expected to produce a harvestable yield) and applying fungicides to wheat crops to minimize leaf diseases. The overall goal of facilitating adaptation to climate variability is to promote sustainable development through reducing vulnerability and facilitating the resilience of people.

Decision making with respect to agricultural weather forecasting in this study is the process of choosing the best alternative for the purpose of attaining specific goals involving the resources, environment, economic and personal characteristics of a farmer. Farmers are the study respondents who devote time and thought to understand atmospheric conditions, especially to weather forecasting. *Kumar (2001)*, *Letson et al. (2001)*, and *Hansen et al. (2004a)* explained that psychosocial characteristics of farmers directly influence their decision making behaviour. The Objective of this article is to study the relationship of decision making behaviour of farmers regarding weather forecasts with their psychosocial characteristics. The research question here is that there will be no significant relationship between independent variables and decision making behaviour of farmers and that the contribution of the former to the latter is not significant.

METHODOLOGY

The study was carried out in Andhra Pradesh state since the researcher belongs to it and familiar with local culture. Ananthapur, Rangareddy and Visakhapatnam districts representing three different regions of the state were selected randomly. Ananthapur and Rangareddy are rainfed, dry regions of the state while; Visakhapatnam gets good quantity of rain and assured irrigation. The problem for farmers in Ananthapur and Rangareddy is coping with droughts while with Visakhapatnam, it is cyclone and disaster management. Of late for the past two years, severe rains battered Rangareddy and Visakhapatnam districts causing floods and havoc, resulting in destruction of standing crops in the rainy season. Of the 63, 37 and 43 mandals of Anantapur, Rangareddy and Visakhapatnam districts respectively, three mandals from each district were selected. Two villages from each mandal making a total of eighteen villages were selected. A sample of 180 farmers @ 10 from each village was selected. The sampling procedure followed for selection of districts, villages and farmers was random.

A draft interview schedule with scales, tests etc. for measuring the variables of the study was first developed and pre-tested before data collection. The variables for the present study had been selected after extensive review of literature on the topic under study and after testing their relevance for the present study in consultation with experts and various sources of information. selected variables and their measurement are depicted in Table 1. The psychosocial variables (independent variables) viz., age, education, farming experience, extension contact, mass media exposure, farm size, market orientation, knowledge of weather, innovativeness, scientific orientation, economic motivation, attitude towards weather forecasts, achievement orientation, value orientation, level of aspiration and risk orientation were identified as likely predictors of decision making behaviour (dependent variable) of farmers. Some of them are operationalized here. Market orientation is the judgment taken by a farmer to sell his produce for better price by analyzing the various factors like harvest, storage and market intelligentsia. Scientific orientation is the degree to which a farmer was oriented to the use of scientific methods in agricultural weather forecasting for decision making. Economic motivation is the extent to which a farmer is motivated towards profit maximization in farming by adopting weather forecasting, and the relative value on economic ends. Achievement orientation is the desire expressed by farmer to achieve personal excellence in a given task. Value orientation is the degree to which an individual is oriented towards thinking, feeling and acting to different activities on farm such as weather forecasting based on the values they hold, such that they become important themes in their behaviour. Risk orientation is the extent to which a farmer was oriented towards risk and uncertainty in adopting weather forecasting in agriculture and allied activities. Level of aspiration is the quantity to which an individual in relation to his/her physical and mental attributes in agriculture and allied fields sets goal.

Decision making index was developed for measuring the decision making behaviour of farmers about weather forecasts. Farmers make several decisions related to inputs, credit, weather, market, government policies etc. Decisions in this study imply the production decisions taken by farmers taking into cognizance the existing weather and information regarding future weather. Farmers in Ananthapur produce groundnut as main crop with average annual rain in the district being 560 mm.

Dryland crops like castor, maize, sorghum, pigeon pea predominate in Rangareddy with annual rain being 750 mm. Sugarcane and paddy are main crops in Visakhapatnam having annual rainfall of 975 mm. Correlation and multiple linear regressions were employed to analyze and interpret the data.

RESULTS AND DISCUSSION

Profile of the farmers: Majority of the farmers in the study were old, with no education, having 21-30 years farming experience, with medium extension contact, mass media exposure, small holdings, high market orientation, medium knowledge of weather, innovativeness, high scientific orientation, medium economic motivation, neutral attitude towards weather forecasts, medium achievement orientation, high value orientation, medium level of aspiration and high risk orientation.

Correlates of decision making behaviour: Coefficient of correlation between decision making behaviour and 16 selected variables was computed and compared (Table 2). Six variables namely, innovativeness, scientific orientation, attitude, achievement orientation, value orientation and risk orientation were found to be positively significant at 0.01 level of probability while knowledge of weather with regard to decision making was found to be positively significant at 0.05 level of probability. The relationship between age, education, farming experience, extension contact, mass media exposure, farm size, market orientation, economic orientation and level of aspiration with decision making behaviour was positive though no significant.

Regression analysis: Further, in order to determine the combined effect of all the independent variables in explaining variation in decision making behaviour of the respondents, multiple linear regression analysis was carried out and the results were presented in Table 3. Out of the sixteen independent variables fitted in the regression equation, extension contact, farm size, knowledge of weather, innovativeness, achievement Market orientation was found to be contributing negatively and significantly at 0.05 level of probability with the decision making behaviour. Though positive, the t values of the variables age, education, farming experience, mass media exposure, attitude, value orientation and level of aspiration reflect their position to be not useful for prediction purposes.

The more the innovativeness, greater would be the decision making behaviour. It was natural that an individual receptive to new ideas and information on weather forecasts tries to experiment with them and takes decisions quickly.

Table 1. Variables and their measurement

S.No.	Variable	Measurement
1.	Age	In completed years.
2.	Education	Scale developed by Venkataramaiah (1983, revised 1990) modified for the study.
3.	Farming Experience	In completed years.
4.	Extension Contact	Scale developed by Bhaskaram (1976) modified for study.
5.	Mass media Exposure	Scale developed by Byra Reddy (1971) modified .
6.	Farm Size	No. of acres possessed.
7.	Market Orientation	Scale developed by Samanta (1977) modified .
8.	Knowledge of Weather	Test developed .
9.	Innovativeness	Scale developed by Feaston (1968) modified .
10.	Scientific Orientation	Scale developed by Supe (1969) modified.
11.	Economic Motivation	Scale developed by Supe (1969) modified.
12.	Attitude towards Weather Forecast	Scale developed.
13.	Achievement Orientation	Schedule developed
14.	Value Orientation	Scale developed by Kittur (1976).
15.	Level of Aspiration	Scale developed by Seema (1986)
16.	Risk Orientation	Scale developed by Supe (1969) modified.
17.	Decision Making Behaviour	Index developed .

Attitude towards forecasts was found to have a positively significant relationship with decision making behaviour of the farmers. It is true that an individual's predisposition towards an object helps or hinders the

capacity to act. With positive feelings, the farmers were bound to take decisions quickly for the purpose of attaining specific goals.The knowledge, experience generated with the application of both scientific and traditional methods of weather forecasts helps the farmers in the process of taking decisions. A farmer oriented towards taking risk and uncertainties in applying weather forecasts was certain to have high decision making ability. The finding was in line with those of *Hansen et al. (2004a)* who, reported that individual differences in farmers' perceptions of the degree of risk posed by climate and other variables affected their farm operation. The relationship between weather knowledge and decision making behaviour was found to be positively significant. This was because as the amount of information, understanding about weather and weather forecasting increases, the decision making ability increases. With knowledge, decisions are taken with conviction and confidence. This result was in conformity with those obtained by *Letson et al. (2001)* who found a significant correlation between the accuracy of Argentine farmers understanding of climate and their acceptance of mitigation responses.Coefficient of multiple determination (R^2) was found to be 0.481, indicating that all the independent variables put together could explain almost half of the variation in the dependent variable i.e., decision making behaviour to the extent of 48.00 per cent.

The F test of statistics showed that the variation was significant at 1.00 per cent level of significance. Farm size exhibited a positive and significant relationship with decision making behaviour of the farmers. With the increase in acreage, the decision process hastens since even if some forecasts go wrong, the farmer can as well compensate by the large holdings. This was not the case with farmers with smallholdings, as they may sometimes tend to lose the crop with awry forecasts. This finding is in line with the contributions of *Kumar (2001)*, that land holding was positively significant with farm decision making of floriculture farmers. Market orientation had a negative and significant relationship with decision making behaviour. This was so because agriculture is season bound and products are highly perishable. Market forces of demand-supply, cost-benefit etc. is in continuous operation.Hence it was imperative for farmers to sell off their produce because hoarding them for longer time is of no use. In this situation, decision making in relation to weather forecasts would only be of secondary consequence. The present finding was in conformity with that of *Hansen et al. (2004b)*, who reported that experience with using climate information to intervene in markets is still limited.

Table 2. Correlation coefficients between the decision making behaviour and independent variables of the respondents

S.No.	Independent variables	'r' value
X_1	Age	0.007
X_2	Education	0.071
X_3	Farming experience	0.115
X_4	Extension contact	0.126
X_5	Mass media exposure	0.020
X_6	Farm size	0.030
X_7	Market orientation	0.085
X_8	Weather knowledge	0.182*
X_9	Innovativeness	0.201**
X_{10}	Scientific orientation	0.437**
X_{10}	Economic motivation	0.024
X_{12}	Attitude	0.327**
X_{13}	Achievement orientation	0.237**
X_{14}	Value orientation	0.581**
X_{15}	Level of aspiration	0.135
X_{16}	Risk orientation	0.506**

** Significant at 0.01 probability level
* Significant at 0.05 probability level.

Table 3. Regression coefficients of independent variables with decision making behaviour

S.No.	Independent variables	Regression coefficient	Standard error	't' value
X_1	Age	0.492	0.328	1.498
X_2	Education	0.132	0.133	0.990
X_3	Farming experience	0.040	0.021	1.887
X_4	Extension contact	0.411	0.172	2.397**
X_5	Mass media exposure	0.043	0.071	0.608
X_6	Farm size	0.039	0.013	2.938**
X_7	Market orientation	-0.390	0.186	-2.097*
X_8	Weather knowledge	0.212	0.091	2.327**
X_9	Innovativeness	0.482	0.219	2.202**
X_{10}	Scientific orientation	-0.050	0.089	-0.569
X_{11}	Economic motivation	-0.280	0.158	-1.772
X_{12}	Attitude	0.016	0.085	0.186
X_{13}	Achievement orientation	0.989	0.459	2.157**
X_{14}	Value orientation	0.044	0.097	0.452
X_{15}	Level of aspiration	0.345	0.311	1.110
X_{16}	Risk orientation	0.250	0.113	2.219**

R_2 = 0.481 F ratio = 5.256**
* Significant at 0.05 probability level
** Significant at 0.01 probability level.

CONCLUSION

The variables viz., knowledge of weather, innovativeness, scientific orientation, attitude, achievement orientation, value orientation and risk orientation of the farmers were found to establish positive and significant association with their decision making behaviour. Regression analysis showed that extension contact, farm size, weather knowledge, innovativeness, achievement orientation and risk orientation contributed positively and significantly towards decision making behaviour. The findings have implications for the understanding of demographic, psychosocial factors and their bearing on improving decision making behaviour by farmers. From the perspective of farmers, psychosocial factors are key ingredients in agricultural weather forecast decision making. This was especially true in maintaining contacts with formal organizations, possessing information regarding weather, and orienting towards risk that reflects good extension contact, knowledge of weather and risk orientation respectively. The relative importance of these factors reflects both internal environment and external social relations of farmers that pave way for collective nature of decision making latitude. Both extension and meteorological organizations should focus and pay attention to the above contributing factors to decision making before they embark with their interventions that enhance the productivity and competitiveness of farmers.

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