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RESOURCE USE MANAGEMENT BEHAVIOUR OF COTTON GROWERS AND ITS DETERMINANTS

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ABSTRACT

Cotton is a major commercial fibre crop in India and plays a vital role in the agricultural economy due to its high economic importance. The present study was carried out in the Saurashtra region of Gujarat, covering Surendranagar, Rajkot and Amreli districts, with the objective of identifying factors influencing resource use management behaviour among cotton growers. An ex-post facto research design was adopted, and data were collected from 288 respondents through a multistage sampling procedure. Multiple regression analysis was applied to examine the relationship between selected independent variables and resource use management behaviour, while stepwise regression analysis was used to identify the most influential predictors. The findings indicated that out of 19 variables, six variables namely yield index, annual income, farming experience, scientific orientation, market orientation and cropping intensity had a significant effect. Among these, yield index and annual income were found to be the most dominant contributors. The regression model explained 53.50 per cent of the total variation in resource use management behaviour. Stepwise regression analysis revealed that yield index alone accounted for 30.90 per cent of the variation, which increased to 50.70 per cent with the inclusion of other significant variables. The analysis of variance further confirmed that the model was highly significant ($F = 50.28$, $p < 0.01$), indicating the reliability of the results. The study highlights that both economic and behavioural factors play a crucial role in efficient resource utilization. Improving farmers' income, productivity and scientific orientation can enhance resource use efficiency and support sustainable cotton cultivation.

Keywords : *cotton growers, resource use management, yield index, annual income, managerial ability*

INTRODUCTION

Cotton is one of the most important commercial fibre crops of India. At present, cotton remains one of the most important fibre crops and holds a prominent position in the textile sector. It significantly contributes to the economic and social development of many countries. Owing to its high commercial value and wide industrial use, cotton is often referred to as "white gold" in the agricultural economy. India is predominantly an agrarian economy, where agriculture continues to be the primary source of livelihood for a large segment of the population. Among various crops cultivated, cotton holds a prominent position as a commercial cash crop and plays a crucial role in the rural economy. India is one of the largest producers, consumers and exporters of cotton in the world, with Gujarat being a leading state in terms of production. Within Gujarat, the Saurashtra region significantly contributes to the state's cotton output, making it a vital area for studying cotton farming practices.

Cotton is one of the major *Kharif* crop grown under both irrigated and rainfed conditions in India. On one hand, cotton crop gives high economic return to the farmers, while on the other hand, there are many risks involved in it. The cultivation of cotton also needs costly inputs in terms of seeds, fertilizers and pesticides. If proper care is not taken, it proves as monetary uncertain business. It is also a crop sensitive to many diseases and pests. It is known as risky crop considering natural hazards, as well as the everyday fluctuating of wholesale price index. Thus, sometimes crises involved in cotton crop create serious consequences on the income and life style of the farmers.

Efficient resource use management in agriculture is essential to achieve sustainability, improve productivity and ensure profitability for farmers. In cotton cultivation, where input costs are relatively high, optimal use of resources such as land, labour, water, fertilizers, pesticides, and machinery becomes critical. Poor management of resources not only increases production costs but also affects yield and long-term soil health. Therefore, studying farmers' behaviour in resource utilization is vital to identify gaps and suggest improvements.

Despite technological advancements and government interventions, many cotton growers still struggle with inefficient resource management, leading to suboptimal yields and reduced income. Understanding the socio-economic and psychological characteristics that influence resource use behaviour can help in designing targeted interventions. Since the Saurashtra region is a major cotton-growing area with diverse farm conditions and farmer profiles, it presents a suitable context to analyze these dynamics.

OBJECTIVE

To analyze the functional relationship between selected independent variables and the resource use management behaviour of cotton growers in the Saurashtra region of Gujarat.

METHODOLOGY

The present study was conducted in the Saurashtra region of Gujarat, specifically in the districts of Surendranagar, Rajkot and Amreli. These districts were purposively selected based on their prominence in cotton cultivation and high levels of cotton production. The research was carried out using an ex-post facto research design, which is appropriate when the independent variables cannot be manipulated as their effects have already occurred. According to Kerlinger (1969), ex-post facto research is a systematic empirical inquiry in which the researcher has no direct control over the independent variables because their manifestations have already taken place or are inherently not manipulable. A multistage sampling technique, involving both purposive and random methods, was used to select the study area and respondents. Initially, three districts were purposively selected for the study. In the next stage, two talukas from each selected district were chosen through random sampling, making a total of six talukas. Subsequently, four villages were randomly selected from each taluka, resulting in an overall sample of 24 villages. Finally, twelve respondents were randomly selected from each village, making the total sample size 288 cotton growers. This sampling design ensured adequate representation across the selected regions and helped in capturing the variability in farm management and resource use behaviour among cotton growers. To analyze the data, multiple regression analysis was employed to determine the extent of influence of various independent variables on the dependent variables - specifically, the resource use management behaviour of cotton growers. The regression technique helped in identifying the most significant factors contributing to the efficiency and effectiveness of resource utilization at the farm level. Stepwise regression was also applied to understand the cumulative contribution of the most influential variables in explaining the variability in the dependent variable.

RESULT AND DISCUSSION

To assess the relationship between selected independent variables and the resource use management behaviour of cotton growers, multiple regression analysis was applied. The analysis included a wide range of socio-economic, psychological, and farm-specific variables to identify their individual effects. Table 1 presents the regression coefficients, standard errors and t-values for 19 independent variables, offering insights into the degree and direction of influence each variable has on resource use management. This statistical evaluation helps determine which variables significantly affect farmers' ability to manage resources efficiently.

Table 1: Regression coefficients between selected independent variables of the respondents with their resource use management behaviour (n= 288)

Sr. No.	Independent variables	Regression coefficient (bi)	S. E. of bi	't' value
1	**Age**	-0.856	0.764	-1.122
2	**Education**	0.194	0.567	0.341
3	**Farming experience**	0.114	0.068	1.681*
4	**Training received**	-0.188	0.439	-0.430
5	**Social participation**	-0.263	0.229	-1.148
6	**Size of land holding**	-0.313	0.614	-0.510
7	**Annual income**	2.059	0.522	3.944**
8	**Extension participation**	0.025	0.029	0.881
9	**Mass media exposure**	0.123	0.136	0.904
10	**Innovativeness**	-0.093	0.576	-0.161
11	**Knowledge**	0.377	0.262	1.442
12	**Risk orientation**	0.106	0.116	0.919
13	**Scientific orientation**	0.148	0.073	2.028*

Sr. No.	Independent variables	Regression coefficient (bi)	S. E. of bi	't' value
14	**Achievement motivation**	0.080	0.152	0.529
15	**Market orientation**	0.332	0.145	2.291*
16	**Irrigation potentiality**	0.236	0.461	0.511
17	**Cropping intensity**	0.057	0.022	2.646*
18	**Yield index**	0.131	0.020	6.554**
19	**Farm mechanization index**	0.035	0.034	1.023

* = Significant at 0.05 level R^2 = 53.50

** = Significant at 0.01 level

The regression analysis was carried out to determine the influence of selected independent variables on the resource use management behaviour of cotton growers in the study area. The results presented in Table 1 reveal that the combined effect of the independent variables accounted for 53.50 per cent of the variation in resource use management behaviour, as indicated by the R^2 value. Out of the 19 variables considered in the model, six variables were found to exert a significant influence on the dependent variable at either the 0.05 or 0.01 level of probability.

Among these, the variable annual income (bi = 2.059, t = 3.944**) showed a highly significant and positive association at the 0.01 level, indicating that farmers with higher income levels demonstrated better resource use management. Similarly, yield index (bi = 0.131, t = 6.554**) had a strong positive impact, suggesting that higher yields encouraged more efficient use of farm resources. At the 0.05 significance level, farming experience (bi = 0.114, t = 1.681*), scientific orientation (bi = 0.148, t = 2.028*), market orientation (bi = 0.332, t = 2.291*) and cropping intensity (bi = 0.057, t = 2.646*) also showed significant positive relationships with resource use management behaviour. These findings indicate that more experienced farmers, those with a scientific mind-set, a stronger market focus, and intensive cropping systems tend to utilize their resources more judiciously.

On the other hand, variables such as age, education, training received, size of landholding, extension participation and mass media exposure did not show a statistically significant effect on resource use management behaviour. Some of these, such as age (bi = -0.856, t = -1.122), had a negative but non-significant relationship, suggesting that older farmers might not necessarily manage resources more efficiently. The negative regression coefficients for variables like training received, social participation, and innovativeness were unexpected, but these were statistically non-significant, which implies that their practical effect in this context is minimal.

In order to understand the cumulative and stepwise contribution of the most influential variables to resource use management behaviour, stepwise regression analysis was conducted. Table 2 displays how each key variable incrementally contributes to the explained variance (R^2) in resource use management. Starting with the most dominant factor, yield index and gradually adding others such as annual income, cropping intensity and behavioural traits, the table highlights how a combination of variables collectively influences efficient resource management among cotton growers.

Table 2: All the variables together were contributing on for overall resource use management behaviour of the respondents (n= 288)

Y = Overall farm managerial ability		
X_3 = Farming experience X_7 = Annual income X_{13} = Scientific orientation	X_{15} = Market orientation X_{17} = Cropping intensity X_{18} = Yield index	
$X_{18} + X_7 + X_{17} + X_3 + X_{15} + X_{13}$	=	R^2 = 50.70
$X_{18} + X_7 + X_{17} + X_3 + X_{15}$	=	R^2 = 50.00
$X_{18} + X_7 + X_{17} + X_3$	=	R^2 = 48.80
$X_{18} + X_7 + X_{17}$	=	R^2 = 47.10
$X_{18} + X_7$	=	R^2 = 43.90
X_{18}	=	R^2 = 30.90

Among all the variables, yield index (X_{18}) emerged as the most influential single factor, independently explaining 30.90 per cent of the variation in resource use management behaviour. This highlights the pivotal role of farm productivity in determining the efficiency and effectiveness of resource utilization by farmers. When annual income (X_7) was added to the model, the explained variance increased to 43.90 per cent, indicating that higher income levels enable farmers to invest more in resource-efficient technologies and practices. The addition of cropping intensity (X_{17}) further raised the explained variance to 47.10 per cent, suggesting that farmers who cultivate more intensively tend to manage their farm resources more effectively.

With the inclusion of farming experience (X_3), the R^2 value rose to 48.80 per cent, reaffirming that practical exposure and long-term involvement in farming enhances decision-making and resource use efficiency. Subsequently, adding market orientation (X_{15}) increased the contribution to 50.00 per cent, implying that a farmer's responsiveness to market signals positively impacts resource planning and management. Finally, the inclusion of scientific orientation (X_{13}) raised the cumulative R^2 to 50.70 per cent, underlining the significance of a scientific outlook in making informed and rational resource use decisions.

The stepwise increase in R^2 values clearly reflects the multifactorial nature of resource use management behaviour. Although yield index alone had a strong impact, the gradual addition of complementary variables revealed that a combination of economic, agronomic, experiential and behavioural factors provides a more holistic explanation.

This finding is in the agreement with the findings of Vinaya *et al.,* (2013); Dalvi *et al.* (2013), Parikh *et al.* (2015), Gohil *et al.* (2016), Sardhara *et al.* (2020), Todkar *et al.* (2020), Padaliya *et al.* (2023), Kalariya and Gulkari (2024); Borra *et al.* (2025); Padaliya *et al.* (2023)

Table 3: Analysis of variance (ANOVA) for regression model (n = 288)

Source	df	Sum of Squares	Mean Square	F value	Sig.
Regression	6	24200.01	4033.33	50.28	0.000
Residual	281	22539.66	80.21		
Total	287	46739.66			

To evaluate the overall significance of the regression model, an analysis of variance (ANOVA) was performed. The results indicated that the model was highly significant, as evidenced by the F-value of 50.28, which was significant at the 0.01 level of probability. This implies that the set of independent variables included in the model collectively contributed to explaining the variation in resource use management behaviour of cotton growers. The significant F-test confirms the suitability and reliability of the regression model for further interpretation. It also indicates that the observed relationship between the dependent and independent variables is not due to chance alone, thereby strengthening the validity of the findings.

CONCLUSION

The present study examined the factors influencing resource use management behaviour among cotton growers in the Saurashtra region of Gujarat. The findings revealed that resource use management is significantly influenced by a combination of economic, experiential and behavioural characteristics of farmers. Among the nineteen variables studied, six variables namely yield index, annual income, farming experience, scientific orientation, market orientation and cropping intensity were found to have a significant effect. Yield index and annual income emerged as the most influential determinants, indicating the importance of productivity and financial capacity in efficient resource utilization. The multiple regression analysis showed that the selected variables together explained 53.50 per cent of the variation in resource use management behaviour, while stepwise regression analysis demonstrated that a limited set of key variables could explain 50.70 per cent of the variation. This highlights that a few critical factors are sufficient to influence farmers' behaviour to a large extent. Furthermore, the analysis of variance confirmed that the regression model was highly significant ($F = 50.28$, $p < 0.01$), ensuring the reliability and validity of the results.

Overall, the study concludes that enhancing farmers' income, improving farm productivity and strengthening scientific and market orientation can lead to better resource management practices. Therefore, focused interventions through extension services, training programmes and policy support are essential to promote efficient and sustainable use of resources in cotton cultivation.

POLICY IMPLICATIONS

Extension agencies and policymakers should promote scientific orientation, market awareness and improved access to quality inputs, credit and irrigation facilities among cotton growers to enhance resource use efficiency, productivity and sustainable cotton cultivation.

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CONFLICT OF INTEREST

The authors confirm that there are no conflicts of interest related to this study.

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