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Evaluation of socio-economic determinants of agricultural extension effectiveness among oilseed farmers

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Abstract

Agricultural extension systems play a vital role in enhancing farmers' knowledge, promoting technology adoption, and improving overall agricultural productivity. The present study examined the influence of selected socio-economic characteristics on the effectiveness of public and private extension systems among oilseed farmers in Mahabubnagar district, Telangana. A total of 120 farmers were selected through a purposive random sampling procedure, and data were collected using structured personal interviews. Correlation analysis was employed to determine the relationship between socio-economic variables and extension effectiveness. The results revealed that under the public extension system, variables such as education, annual income, trainings undergone, social participation, input acquisition pattern, information-seeking behaviour, achievement motivation, risk-taking ability, knowledge, and market intelligence showed a positive and significant association with effectiveness. These findings indicate that farmers with better educational backgrounds, stronger economic conditions, greater exposure to training, and higher social involvement are more likely to benefit from public extension services. Psychological and behavioural attributes such as motivation, risk-taking ability, and information-seeking tendencies also contributed significantly to effective utilization of public advisory services. Similarly, in the private extension system, the same variables exhibited significant positive relationships with extension effectiveness. This suggests that private extension services tend to be more effective among progressive, informed, and socially active farmers who possess the capacity and willingness to adopt improved agricultural practices. Overall, the study concludes that socio-economic and behavioural characteristics play a crucial role in shaping the effectiveness of both public and private extension systems. Enhancing farmers' access to training opportunities, income-generating activities, and educational support can substantially strengthen extension outcomes and contribute to sustainable agricultural development and improved livelihoods among oilseed farmers.

Keywords: Agricultural extension, socio-economic factors, extension effectiveness, oilseed farmers

Introduction

Agriculture forms the backbone of India's economy, providing livelihood to nearly 58% of the population and contributing around 18% to the country's Gross Domestic Product (GDP) (Government of India, 2023) [5]. Despite its central role, the sector continues to face deep-rooted structural and operational challenges. Fragmented and small landholdings dominate India's agrarian landscape, limiting economies of scale and reducing the capacity for mechanization and efficient input use. Farmers, particularly in semi-arid regions, encounter constraints such as inadequate irrigation facilities, low levels of mechanization, limited adoption of modern technologies, and insufficient market infrastructure. These constraints are further aggravated by unpredictable climate patterns, frequent droughts, and increasing production costs, leading to unstable and often insufficient farm incomes (FAO, 2023) [3]. Small and marginal farmers, who constitute more than 85% of the farming population, are most affected by these bottlenecks. Their limited resource base and restricted access to timely information hinder adoption of improved production practices, resulting in lower yields and reduced profitability. Enhancing the efficiency and effectiveness of agricultural extension services has thus become an essential strategy for addressing existing productivity gaps, promoting technology adoption, and ensuring sustainable livelihood improvement.

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In this context, Telangana presents a clear example of the challenges confronting Indian agriculture. Although the state has made significant strides since its formation, agriculture remains predominantly rainfed and productivity levels in several crops including major oilseeds remain below potential. The oilseed sector, an important component of the state's agricultural economy, is characterized by low and inconsistent yields, heavy dependence on monsoon rainfall, suboptimal input utilization, and weak market linkages. Many oilseed farmers in Telangana operate on small parcels of land, often struggling with issues such as soil degradation, limited access to quality seeds, pest and disease pressures, and insufficient institutional support (Government of Telangana, 2024) ^[5]. Given these constraints, both public and private extension systems play a crucial role in disseminating scientific knowledge, introducing improved technologies, training farmers in best practices, and providing timely information on production, post-harvest handling, and marketing. However, the actual impact and effectiveness of these services vary substantially across farming communities, largely due to differences in farmers' socio-economic characteristics. Factors such as education, landholding size, annual income, farming experience, social participation, extension contact, and the number of trainings attended significantly shape farmers' ability and willingness to adopt modern agricultural practices (Patel *et al.*, 2024) ^[9]. Understanding how these variables influence extension effectiveness is critical for designing strategies that are inclusive, demand-driven, and context-specific.

This study therefore seeks to examine the influence of key socio-economic determinants on the perceived effectiveness of public and private extension services among oilseed farmers in Telangana. By identifying which farmer

characteristics most strongly contribute to successful utilization of extension inputs, the study aims to provide evidence that can help refine extension delivery models, enhance communication approaches, and increase farmer participation in capacity-building activities. Insights derived from this analysis will support policymakers, researchers, and development agencies in formulating targeted interventions that strengthen technology adoption, improve productivity, and ultimately contribute to the economic empowerment and long-term resilience of oilseed growers in the state.

Methodology

The study was carried out in Mahabubnagar district of Telangana state, focusing specifically on major oilseed-growing areas. A purposive random sampling technique was employed to ensure representative coverage of regions with the highest area under oilseed cultivation. Three mandals were first selected purposively, after which four villages were randomly chosen from each mandal. From every selected village, ten oilseed farmers were randomly sampled, resulting in a total sample size of 120 respondents. Data were collected through structured personal interviews using a pre-tested schedule that captured farmers' socio-economic characteristics and their perceptions of the effectiveness of public and private agricultural extension services. The collected data were coded, tabulated, and analyzed using descriptive statistics to summarize key variables. Pearson's correlation coefficients were employed to examine the relationships between selected socio-economic factors and extension effectiveness. All statistical analyses were performed using SPSS software.

Results and Discussion

Table 1: Distribution of respondents based on their relationship between selected profile characteristics with effectiveness of public and private extension systems (n = 120)

S. No.	Variable No.	Characteristics	Correlation coefficient (r)	
			Public (n = 75)	Private (n = 45)
1.	X1	Age	0.021NS	-0.062NS
2.	X2	Education	0.214*	0.425**
3.	X3	Size of landholding	0.022NS	0.021NS
4.	X4	Annual income	0.474**	0.358**
5.	X5	Farming experience	0.038NS	-0.143 NS
6.	X6	Trainings undergone	0.331*	0.281**
7.	X7	Irrigation potential	-0.082NS	-0.080 NS
8.	X8	Social participation	0.209*	0.228*
9.	X9	Input acquisition pattern	0.195*	0.190*
10.	X10	seeking behaviour	0.403**	0.321**
11.	X11	Achievement motivation	0.233*	0.220*
12.	X12	Risk taking ability	0.202*	0.198*
13.	X13	Knowledge	0.327**	0.334**
14.	X14	Market intelligence	0.234*	0.314**

* = Significant at $p = 0.05\%$, ** = Significant at $p = 0.01\%$, NS = Non-Significant

Relationship between selected profile characteristics with effectiveness of public and private extension systems

The results presented in Table-1 indicate that the relationship between selected profile characteristics of farmers and the effectiveness of public and private extension systems varied considerably across variables. Under the public extension system, several socio-economic, psychological, and behavioural characteristics exhibited a positive and significant association with extension

effectiveness. Notably, variables such as education, annual income, trainings undergone, social participation, input acquisition pattern, information-seeking behaviour, achievement motivation, risk-taking ability, knowledge, and market intelligence showed strong and significant correlations with farmers' perceived effectiveness of the public extension system. This suggests that farmers with higher levels of education and income are generally more capable of understanding extension messages, interpreting technical information, and adopting recommended

innovations. Education equips farmers with the cognitive skills necessary to process new knowledge, while higher income improves their ability to purchase quality inputs, experiment with new technologies, and manage risks effectively. Similarly, farmers who had attended more trainings demonstrated greater appreciation for extension services. Training programs improve farmers' confidence, awareness, and practical skills, which in turn enhance their capacity to implement improved agricultural practices. Social participation also contributed positively to extension effectiveness, indicating that farmers engaged in community groups or organizations are more likely to receive information, share experiences, and collectively adopt technologies. These socially active farmers tend to be more open to extension interactions and benefit from peer learning.

Psychological and behavioural attributes such as information-seeking behaviour, achievement motivation, and risk-taking ability also showed a significant association. Farmers who proactively seek information are naturally more attuned to extension advisories and better equipped to use them. Likewise, individuals with stronger achievement motivation or greater risk-taking ability are more likely to adopt new practices promoted by extension personnel. Knowledge and market intelligence further strengthened this relationship; farmers who possess better awareness of markets, prices, and input requirements are more capable of recognizing the economic value of extension recommendations. This highlights the role of informed decision-making in optimizing extension benefits. Conversely, variables such as age, size of landholding, farming experience, and irrigation potential did not show significant relationships with the effectiveness of public extension services. The non-significant association of age suggests that both younger and older farmers may engage similarly with the public system, possibly due to uniform access through government channels. The absence of significant influence from landholding size or farming experience indicates that public extension services may be reaching farmers across different resource levels, without strong bias toward larger or more experienced producers. Irrigation potential also showed a negative but non-significant relationship, implying that the availability of irrigation alone does not necessarily enhance how farmers perceive extension effectiveness. This may be because extension recommendations often address a wide range of production aspects beyond irrigation.

For the private extension system variables such as the education, annual income, trainings undergone, social participation, input acquisition pattern, information-seeking behaviour, achievement motivation, risk-taking ability, knowledge, and market intelligence displayed positive and significant relationships with effectiveness of the private extension services. This consistency indicates that farmers with strong socio-economic and behavioural attributes are better positioned to engage with private extension providers. Private extension systems often involve cost-based services or product-linked advisories; therefore, farmers with greater financial stability and higher motivation are more likely to utilize and benefit from them. Well-educated farmers, in particular, may find private extension advice clearer, more customized, and easier to apply. Variables like age, farming experience, and irrigation potential exhibited negative and non-significant correlations with private extension

effectiveness. Older or more experienced farmers may rely on traditional practices or their accumulated knowledge, reducing their dependence on private advisory services. The non-significance of irrigation potential suggests that private extension services may rely more on personalized communication and product-driven interactions rather than infrastructural conditions. These findings align with previous research by Grace (2020) ^[6]; Naidu and Bose (2016) ^[8]; Gebremariam (2021) ^[4]; Sathish (2015) ^[12]; and Loki *et al.* (2020) ^[7], which consistently reported that factors such as education, income, training exposure, knowledge, and information-seeking behaviour significantly influence farmers' engagement with and perception of extension services. Together, these results reinforce the importance of socio-economic and behavioural characteristics in shaping extension effectiveness across both public and private systems.

Conclusion

The study clearly demonstrated that the effectiveness of both public and private extension systems is significantly influenced by farmers' socio-economic and behavioural attributes. Education, income, training exposure, landholding, and extension contact emerged as the most critical determinants of extension effectiveness in both systems. These factors collectively enhance farmers' capacity to understand, interpret, and implement improved agricultural practices. Among these, training undergone and extension contact played a particularly vital role, emphasizing the need for continuous interaction between farmers and extension agents to facilitate knowledge exchange and adoption. For the public extension system, mass media utilization also contributed significantly, reflecting the continued relevance of traditional communication channels for wider information dissemination. In contrast, private extension systems showed greater dependence on personal interaction, with education, farming experience, and income serving as key enablers of effectiveness. Overall, strengthening farmers' human capital, providing regular training, and improving coordination between public and private agencies will be essential for enhancing extension impact and achieving sustainable agricultural growth.

Future Recommendation

Future programs should focus on integrating public and private extension efforts to ensure broader and more efficient service delivery. Special attention must be given to improving farmers' educational and training opportunities, as these directly influence technology adoption and extension effectiveness. Developing digital platforms and ICT tools can complement traditional methods to enhance outreach, especially for small and marginal farmers. Strengthening linkages among research institutions, extension agencies, and farmers will help ensure timely knowledge transfer and feedback. Finally, capacity-building initiatives emphasizing market intelligence, risk management, and entrepreneurship should be prioritized for long-term sustainability.

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