



Fostering rural development through agricultural extension: A case study of Bagavatula Charitable Trust - Krishi Vigyan Kendra, Visakhapatnam

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Abstract

This article presents the information about the functioning of Krishi Vigyan Kendras (KVKs), in Visakhapatnam. The KVK is implementing by a voluntary organisation named Bagavatula Charitable Trust (BVK). Krishi Vigyan Kendras (KVKs), established by the Indian Council of Agricultural Research (ICAR) in 1974, have been instrumental in addressing these challenges through agricultural extension and education. With over 725 centers nationwide, KVKs operate as the interface between research and the farming community, translating scientific advancements into practical applications tailored to local needs. The respondents (90%) are smallholder farmers (owning less than 1 hectare). The respondents stated that in KVK programs they are interested in Integrated Pest Management (34.5%), along with a notable inclination toward sustainable practices such as natural farming (31%) and organic farming (17.2%). These trends suggest that farmers are increasingly aware of the benefits of sustainable and eco-friendly methods. The challenges identified in adopting new practices underline the complexity of shifting agricultural methods. Key obstacles include limited technical knowledge (26.67%) and resource constraints (20%), with an additional 20% of farmers citing a combination of resource, time, and labor constraints. These challenges suggest that, despite interest in modern techniques, many farmers lack the necessary support to fully adopt them. The impact of KVK programs on income has been significant, with 100% of surveyed farmers reporting an increase in earnings after adopting recommended practices. In terms of communication, farmers displayed a strong preference for traditional outreach methods, with 46.7% favoring printed materials and community meetings as their primary information sources. Recommendations such as micro-financing schemes, community-based resource centers, and digital outreach programs provide farmers with essential resources and knowledge, facilitating adoption of sustainable, climate-resilient practices. By collaborating with local institutions and employing data-driven interventions, KVK can ensure that their programs are responsive to the specific needs of Visakhapatnam's farming community, creating a more resilient agricultural sector.

Keywords: Agriculture, farmers, Krishi Vigyan Kendras, rural development

Introduction

Agriculture in India is integral to the nation's socio-economic framework, sustaining over half of the population and contributing substantially to GDP (FAO, 2022) ^[6]. The journey of Indian agriculture spans from ancient practices in the Indus Valley Civilization around 7,000 BCE, where early domestication of crops like wheat, barley, and cotton took place, to the Green Revolution of the 1960s that radically transformed food production. During the medieval period, regions like the Gangetic plains were known for agricultural surplus, supporting thriving cities and kingdoms, with irrigation systems that harnessed wells, tanks, and canals (Ministry of Agriculture, 2016) ^[12]. However, the 20th century brought unprecedented changes. The Green Revolution, for instance, led to a significant rise in wheat and rice production, with food grain output increasing from 82 million tonnes in 1960 to 131 million tonnes by 1979 (Ministry of Agriculture, 2022) ^[14]. Yet, this

revolution also brought environmental costs, such as soil degradation, groundwater depletion, and ecological imbalances.

Krishi Vigyan Kendras (KVKs), established by the Indian Council of Agricultural Research (ICAR) in 1974, have been instrumental in addressing these challenges through agricultural extension and education. With over 725 centers nationwide, KVKs operate as the interface between research and the farming community, translating scientific advancements into practical applications tailored to local needs. The BCT KVK in Visakhapatnam, for example, has focused on sustainable practices that increase productivity while conserving resources, thus supporting rural development. These centers offer a suite of services, including On-Farm Testing (OFT), Frontline Demonstrations (FLDs), skill development, and capacity building. Between 2015 and 2020, KVKs trained over 2 million farmers, with nearly 30% of participants being

women, indicating efforts to promote gender inclusivity in agricultural decision-making (ICAR, 2020)^[9].

In Andhra Pradesh, KVKs have introduced drought-resistant crop varieties, such as millet and groundnut, particularly in arid regions like Rayalaseema, where yields have shown a 15-20% increase compared to traditional crops. KVKs have also promoted integrated pest management (IPM) practices, reducing pesticide usage by 30% while improving crop health. In Vishakhapatnam's tribal areas, KVKs have encouraged organic coffee cultivation, which has seen a 10-12% increase in productivity, benefiting over 1,500 tribal farmers with higher incomes from organic certification and value-added products (ICAR, 2020)^[9]. These commercial crops promote the development among tribals (Abraham & Visweswara Rao, 2023)^[1]. This regional focus exemplifies KVKs' commitment to tailoring solutions to local challenges, thereby increasing adoption rates and maximizing impact.

KVKs play a critical role in capacity building, offering training in climate-resilient techniques, post-harvest management, and value addition, which are essential in improving both productivity and economic returns for farmers. For example, soil health campaigns initiated by KVKs led to the distribution of 45 million soil health cards by 2020, which have helped farmers better manage nutrient applications, leading to improved soil fertility and balanced use of fertilizers in states like Madhya Pradesh and Rajasthan (Ministry of Agriculture, 2020)^[13]. KVKs' impact assessments indicate an average yield increase of 10-20% across major crops due to these interventions, particularly in high-yielding varieties of rice, wheat, and oilseeds, which have also improved farmers' income stability and resilience (Mutluri *et al.* 2024)^[16].

The multi-dimensional approach of KVKs encompassing technology transfer, skill training, and community-specific interventions addresses both current agricultural challenges and future sustainability goals. In the long term, the role of KVKs in promoting sustainable practices, climate-smart agriculture, and rural livelihoods positions them as a cornerstone in India's rural development strategy. Through localized solutions, adaptive training, and farmer-centric models, KVKs continue to drive forward India's agricultural landscape, ensuring it remains productive, resilient, and socially inclusive in the face of evolving climate and economic pressures.

Review of Literature

Gupta, R., & Sharma, N. (2017)^[8] This study examined the role of KVKs in enhancing agricultural productivity in Punjab. The researchers noted that KVKs were instrumental in improving yield and adoption of modern farming practices among small farmers. They highlighted that the farmer training programs offered by KVKs significantly increased awareness and practical skills related to crop management and soil health. The study suggested scaling up KVK training programs to reach a broader farming

population (Gupta & Sharma, 2017)^[8]. Singh, K., & Meena, B. S. (2018)^[22] Focusing on KVKs in Rajasthan, Singh and Meena explored their impact on farmer knowledge and adoption of innovative practices. The study found that farmers associated with KVKs were more likely to adopt climate-resilient agricultural practices and sustainable farming techniques. These findings underscored the role of KVKs as essential knowledge hubs that help farmers mitigate risks associated with climate change. The authors suggested increasing funding and resources for KVKs to expand their climate-smart agriculture programs (Singh & Meena, 2018)^[22].

Kumar, A., & Patel, D. (2020)^[11] This study reviewed the outreach and effectiveness of KVKs in Maharashtra, focusing on their extension activities such as field demonstrations, training, and workshops. The study indicated that KVKs effectively transferred knowledge about water conservation practices and organic farming. However, limited resources and high staff turnover were identified as significant challenges to their operational efficiency. The authors recommended government support to strengthen KVK infrastructure and personnel stability (Kumar & Patel, 2020)^[11]. Reddy and Rao's research evaluated the impact of KVKs in Andhra Pradesh on the livelihoods of marginal farmers. They reported positive outcomes in terms of income enhancement and diversification due to KVK interventions, particularly in livestock and horticulture training. The study advocated for diversified training content that would address the specific needs of marginal and landless farmers, emphasizing the potential of KVKs to drive socioeconomic growth (Reddy & Rao, 2021)^[21]. Patil and Desai conducted a study to assess the effectiveness of KVK programs in Karnataka, focusing on farmers' adoption of integrated pest management (IPM) techniques. The research highlighted that KVKs were successful in promoting IPM practices, leading to reduced pesticide usage and improved crop quality. However, the study identified logistical challenges, such as the need for more frequent training sessions and follow-ups with farmers. The authors recommended that KVKs increase their collaboration with local agricultural universities for resource sharing and curriculum development (Patil & Desai, 2022)^[20]. These studies collectively illustrate the varied impacts of KVKs across regions and highlight their critical role in rural development, sustainable agriculture, and farmer capacity building in India.

Objectives of the Study

1. To analyze the current extension programs conducted by KVK Visakhapatnam and assess the number of participants involved;
2. To understand the perception of farmers regarding the relevance and effectiveness of KVK's extension services;

3. To explore the perception of KVK staff concerning the challenges they face in delivering agricultural extension services;
4. To identify the challenges faced by farmers in implementing the knowledge gained from KVK interventions; and
5. To recommend solutions for overcoming the identified challenges and improving the delivery of extension services.

Research methodology

The research methodology employed in this study aims to comprehensively evaluate the role of Krishi Vigyan Kendra (KVK) Visakhapatnam in agricultural extension, focusing on program participation rates and the perspectives of both farmers and KVK staff. A mixed-methods approach, combining descriptive and exploratory methods, was chosen to facilitate the collection and analysis of both qualitative and quantitative data. The study addresses a critical problem: while KVK Visakhapatnam has implemented numerous extension initiatives to tackle issues such as low productivity and limited access to modern technology, the actual impact and adoption of these interventions remain uncertain. Key objectives include assessing the relevance and effectiveness of KVK programs from the viewpoints of both farmers and KVK personnel and identifying the challenges encountered in knowledge application and program delivery.

The study area comprises Visakhapatnam district in Andhra Pradesh, characterized by diverse agro-climatic zones that include coastal plains and tribal highlands. These zones present unique challenges, making them suitable for an in-depth assessment of KVK's efforts. The research design integrates descriptive methods to summarize program participation and outcomes, alongside exploratory methods to gain insights into the experiences and challenges of stakeholders.

Sampling targets key informants, including KVK staff directly involved in program delivery and 30 farmers, ensuring a gender-inclusive representation. Data collection methods encompass structured surveys, semi-structured interviews, and focus group discussions (FGDs), providing both quantitative data (e.g., satisfaction, participation rates) and qualitative insights (e.g., challenges and experiences). The data will be analyzed using descriptive statistics for quantitative findings, while qualitative data from interviews and FGDs will undergo thematic analysis to identify recurring challenges and insights. This methodology aims to create a well-rounded understanding of KVK Visakhapatnam's impact and identify actionable solutions for enhancing its extension services.

Findings

The findings from this study provide a detailed analysis of KVK Visakhapatnam's role in supporting local farmers, focusing on demographic insights, program participation,

challenges in adopting new practices, and income changes. The demographic profile of farmers highlights a predominantly middle-aged, male-dominated group (80.2% in the 36-50 age range and 80% male), indicating that agricultural responsibilities in the region are largely borne by middle-aged men. While 53.3% of respondents have secondary education, enabling them to grasp basic training concepts, 6.7% of farmers have no formal education, indicating that a portion of the audience may face difficulties with advanced training content. Additionally, most respondents are smallholder farmers (90% owning less than 1 hectare), reflecting significant resource limitations that may affect their ability to invest in larger-scale or resource-intensive agricultural innovations.

Participation in KVK programs reveals a keen interest in Integrated Pest Management (34.5%), along with a notable inclination toward sustainable practices such as natural farming (31%) and organic farming (17.2%). These trends suggest that farmers are increasingly aware of the benefits of sustainable and eco-friendly methods. Nevertheless, engagement in programs on Climate-Resilient Agriculture, Livestock Management, and Vermicompost Production remains low, with each attracting only 3.4% of participants. This disparity suggests an opportunity for KVK to enhance outreach for these programs and address potential barriers to participation, such as limited awareness or perceived relevance.

The challenges identified in adopting new practices underline the complexity of shifting agricultural methods. Key obstacles include limited technical knowledge (26.67%) and resource constraints (20%), with an additional 20% of farmers citing a combination of resource, time, and labor constraints. These challenges suggest that, despite interest in modern techniques, many farmers lack the necessary support to fully adopt them. Time and labor constraints alone impact 6.67% of farmers, indicating that even if resources and knowledge are accessible, limited manpower and time restrict some farmers from implementing new practices.

The impact of KVK programs on income has been significant, with 100% of surveyed farmers reporting an increase in earnings after adopting recommended practices. This improvement underscores the economic value of KVK interventions, as increased income not only enhances household stability but also enables farmers to reinvest in their agricultural activities, potentially leading to further productivity gains.

In terms of communication, farmers displayed a strong preference for traditional outreach methods, with 46.7% favoring printed materials and community meetings as their primary information sources. Only a small portion (6.7%) indicated a preference for digital channels like SMS or WhatsApp, suggesting that digital literacy and access to technology may be limiting factors for many farmers in the region. This insight highlights the importance of

maintaining traditional communication channels to effectively reach this audience.

Overall, the findings emphasize the importance of addressing farmers' resource and knowledge gaps, promoting broader awareness of climate-resilient and livestock programs, and tailoring communication methods to the demographic's preferences. Enhanced support for female and young farmers, as well as tailored training for smallholders, can help KVK Visakhapatnam increase the adoption of modern and sustainable agricultural practices in the region, contributing to long-term rural development and resilience.

Suggestions

The suggestions provided offer a comprehensive approach to strengthening KVK Visakhapatnam's agricultural extension services by addressing key gaps identified in the study. The findings highlight areas such as gender inclusivity, youth engagement, and support for smallholder farmers, which are crucial for enhancing the effectiveness of KVK programs. By tailoring training programs to be more inclusive, particularly for women who face unique challenges in accessing resources, and by focusing on attracting younger farmers through technology-driven and entrepreneurship-focused initiatives, KVK can foster a more diverse and sustainable agricultural community. Additionally, flexible training schedules and value-added activities are recommended to accommodate farmers with multiple occupations, helping them to optimize their income streams. Given that 90% of respondents are smallholders, KVK should promote high-yield, affordable technologies and cooperative models that enable small farmers to pool resources and access larger markets. Enhanced field support, through follow-up visits and real-time technical assistance, can bridge the gap between training and practical application, especially for those constrained by limited technical knowledge. Recommendations such as micro-financing schemes, community-based resource centers, and digital outreach programs provide farmers with essential resources and knowledge, facilitating adoption of sustainable, climate-resilient practices. By collaborating with local institutions and employing data-driven interventions, KVK can ensure that their programs are responsive to the specific needs of Visakhapatnam's farming community, creating a more resilient agricultural sector.

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