International Journal of Agricultural Extension and Rural Development ISSN 2756-3642 Vol. 12 (1), pp. 001-006, March, 2025. Available online at www.internationalscholarsjournals.org © International Scholars Journals

Full Length Research Paper

An Analysis of the Value of Agricultural Extension Programs in Rural Farmers' Technology Transfer

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Accepted 16 March, 2025

The most efficient area of agricultural extension is extension program management, which modifies and facilitates programs aimed at raising rural farmers' productivity and standard of living through the use of modern agricultural technology and information. To support that, various studies on agricultural technology transfer for farmers impacted by the administration of agricultural extension programs have been carried out. Additionally, extension agents play a crucial role in transferring technology to rural farmers; they do all in their power to convince farmers to incorporate technology into their farming practices. Unquestionably, overseeing successful programs for farmers to transfer technology is thought to be the most effective way to encourage them to work hard and wisely. It also has the indirect impact of increasing farmers' revenue, which raises national income. Because the extension programs use agricultural technologies relevant to their job, they have a significant impact on farmers' output. However, in order to make extension work successful and efficient, some limitations related to technology transfer extended work should be recognized in the majority of nations worldwide, and some relevant strategies should be devised with extension. Agricultural extension staff must use critical and logical thinking to establish an effective extension program and work on it well to inform and educate the farmers. This is because one of the biggest problems facing the mission of agricultural extension is the lack of proper knowledge about the new technologies from farmers toward applying information and technology.

Key words: Agricultural extension, extension programs management, farmers, technology transfer, agricultural technology.

INTRODUCTION

In addition to being one of the most important organizations for rural development, agriculture extension also aims to promote development, social and economic transformation, and the establishment of the foundation for future development (Al-Doski and HamaSalih, 2017). According to Alex, Zijp, and Byerlee (2001), "extension" is a non-formal educational role that applies in numerous institutions and disseminates information and assistance to strengthen knowledge, attitudes, abilities, and aspirations, despite the phrase being frequently associated with agricultural and rural development.

By educating and enhancing rural farmers' knowledge and abilities on how to employ technology and helpful information in their farming methods, agricultural extension is a methodical and effective process that helps them help themselves. Additionally, through a controlled extension program, extension specialists collaborate with farmers to convince them to embrace the technology. Unfortunately, the agricultural industry is producing far less than it should because of a number of technical obstacles and other new difficulties that have emerged recently. Throughout Asia's green revolution, agricultural rural extension has been crucial to raising crop yields (Baig and Aldosari, 2013). It is well recognized that the agricultural extension program helps farmers identify their issues, gather knowledge, transfer new technology, and organize farmer associations (Baig and Aldosari, 2013). Development is causally influenced by changes in technology and the knowledge system that underpins it (World Bank, 2003a). Additionally, by teaching farmers the best agricultural and

management techniques and exposing them to new technologies, extension access aids in farmers' acceptance of new technologies (Anderson and Feder, 2007). The success of the agricultural sector depends on the continued efficient management of agricultural extension services, which has been recognized as a basic challenge in the provision of extension services (Lopokoiyit et al., 2013). Because it is an essential component of economic life and because it provides leadership to a business firm, management holds a crucial position in the modern world, which is an organized group activity (Aquinas, 2007). Access to extension services promotes the adoption of cutting-edge agricultural technologies by mitigating supply-side limitations brought on by ineffective information marketplaces (Wossen et al., 2015). The study's goals are to ascertain the significance of agricultural extension programs in facilitating technology transfer for rural farmers, ascertain the impact of these programs, ascertain how program management boosts farmers' productivity, and ascertain the perspectives of earlier researchers regarding the function of extension management in promoting technology transfer for rural farmers. The following questions were addressed by this study: How does the management of agricultural extension programs affect technological transfer? How can the administration of agricultural extension programs boost farmers' output? How can the administration of extension programs help rural farmers transfer technology?

Theoretical Literature

Examples of extension include technology transfer, advisory services, cooperative extension, agriculture and rural development, and the sharing and distribution of useful information (Godad, 2010). Extension services have become crucial in giving farmers the information they need to address common agricultural issues like crop disease outbreaks and unfavorable economic conditions that impact production levels. Farmers should be given support to overcome these challenges or adjust to changing conditions (Godad, 2010). Particularly in developing countries, where there is a greater need for such resources, agricultural extension services play a crucial role in the development of rural knowledge and innovative farming practices. These systems are essential for educating and influencing rural family decisions (Alex and Zijp, 2002). Governments employ agricultural extension as a key agrarian and political tactic to promote the expansion of agricultural output (Qamar, 2005). Systems of agricultural extension must be set up to assist farmers in developing their farming skills, teach them how to communicate with producers in an efficient manner, and motivate them to acquire new knowledge (Qamar, 2005).

It is the responsibility of extension agents to teach farmers new technologies, acquire new information, and apply extension education concepts. They also help farmers assess their needs, limitations, priorities, and opportunities. They also help farmers understand the significance of enhanced agriculture, choose the right crops, promote the use of pertinent technologies, and gauge farmers' responses and attitudes toward development initiatives (Altalb et al., 2015). In addition to supporting viable development programs, extension agents are crucial in motivating farmers to take part in project identification, planning, execution, and assessment. Their roles in agricultural technology transfer include educating clients about extension agents' innovations, something new or unknown to them, persuading them of the value or utility of the new technologies, encouraging them to continue using the developed technology, and fostering interest in putting the new idea into practice through supporting services like input and acting as a go-between for farmers and researchers (AREMU et al., 2015). By targeting and assisting clients who have embraced innovation, extension agents work to stabilize change and new behavior and try to avoid discontinuance (AREMU et al., 2015).

In addition to maintaining interpersonal relationships with peers, superiors, other sectors, sections, organizations, and subordinates, a competent manager must be able to make balanced judgments, which are essential for making logical decisions. This can be achieved by employing man-management techniques (Akeredolu, 2016).

There is a broad scope in the management sector, which includes all aspects of production, marketing, financing, and personnel: Management of production is responsible for directing, organizing, planning, and controlling all production functions within an organization; management of marketing is responsible for determining consumer needs and then putting everything in place so that the items and services that will meet the needs can be delivered; and management of finance is responsible for determining consumer needs and then putting everything in place so that the items and services that will satisfy those needs can be delivered, It entails market research, advertising, and selecting the appropriate channel of distribution; salespeople will report to marketing management; financial management, which is responsible for ensuring that an organization has sufficient financial resources available for operation; they are responsible for calculating project costs and then selecting the appropriate sources of funding to suit a specific project; and legal management, which is responsible for ensuring that an organization has sufficient legal resources available for operation, human resources manages employee recruitment, selection, training, and development, as well as compensation, promotions, transfers, and employee welfare services, they also store personnel records in the enterprise (Akeredolu, 2016). Farm management extension is concerned with the development of management methods and skills among farmers to improve resource decision-making and connect farmers to markets. Additionally, farmers' decisions are becoming more complex as farming becomes more market-oriented; in order to compete, farms

must be run as businesses. The extension services for management give farmers business and marketing knowledge and skills to help them make their farms more profitable and competitive. At the moment, only a small number of farmers directly benefit from farm business management advice; these farmers are more profit-minded and market-oriented and are skilled at managing production and marketing systematically (Kahan, 2013).

LITERATURE REVIEW

According to LAFTA (2009), the purpose of this study was to identify barriers to agricultural technique transfer from the viewpoint of extension farmers, as well as constraints on the order in which each area of agricultural technique transfer should be carried out. Additionally, the study aimed to identify barriers to the arrangement of agricultural technique transfer areas based on their relative importance from the viewpoint of farmers. and sought to determine, from the viewpoint of farmers themselves, the barriers to agricultural technology transfer. All of the study's participants were farmers in the Tarmiya neighborhood of Baghdad. A questionnaire was made and distributed to each participant in the study, and a random sample of 150 farmers, or 5% of the population, was selected. The results indicate that organizational, social, technological, and financial constraints were given priority. The study comes to the conclusion that extension research and service institutes should be reinforced in addition to providing help to all farmers.

According to Lopokoiyit et al. (2013), 440 extension agents in total—325 from the public sector and 115 from the private sector—were sampled for the study in order to determine the extension management competency requirements of agricultural extension professionals. A questionnaire about the extension staff's present competences and training requirements was used to gather data for the study. The data was then analyzed using both descriptive and inferential statistics. According to the study's findings, extension management skills are critical from four angles: first, in managing projects and programs for extension services; second, in managing extension personnel; and third, in managing networks, partnerships, and collaborations within the agricultural industry. Lastly, but just as importantly, good communication is a critical skill needed for efficient management of farmer interactions in order to build trust and create a supportive environment for efficient extension service delivery.

Finding the obstacles to agricultural extension services in Asia and creating some practical solutions to raise the productivity, effectiveness, and cost-effectiveness of national extension services were the goals of Baig and Aldosari's (2013) study, Agricultural Extension in Asia: Constraints and Opportunities for Improvement. In order to understand the current state of agricultural extension services and rural situations, the study technique involved reviewing some theoretical background and prior research. Organizations like FAO (2005) and APO (2006) have recorded the main reasons for the failures. The results of the study demonstrate that, despite the fact that extension has a variety of tools at its disposal, it has not been able to significantly impact many Asian countries, help farmers assess their issues and circumstances, or provide them with improved development strategies over the past 20 years. extending strategies that consider the perceived needs of a nation. Additionally, as the majority of Asian nations have poor literacy rates, new technologies could be effectively communicated and transferred from the source to illiterate farmers and less educated rural masses using television, films, and other graphical communication techniques. Since farm radio is the primary source of extension advice for the great majority of impoverished farmers, radio should not be used to broadcast complicated or elaborate messages that contain more technical information. To increase efficacy, information and communication technology (ICT) can be paired with other extension strategies.

In this study, Altalb et al. (2015) examine the role of Extension workers in agricultural technology transfer, the process of farmers adopting and transferring agricultural technology, the initial requirements that are reliable when choosing agricultural technology for small farmers, the basic requirements that are reliable when choosing agricultural technology for small farmers, and the cycle of agricultural technology transfer to farmers. The methodology of this article has been examined through the use of scientific studies and references, as well as the advantages of previous studies related to agricultural extension in the discussion and drafting of the study objectives. According to the findings, agricultural extension is the key to bringing agricultural innovations to farmers and convincing them to adopt new farming methods. It is an educational process for farmers with the goal of improving agricultural production in terms of both quantity and quality as well as developing agricultural skills and knowledge. The study's conclusions indicate that agricultural extension agents are essential to the dissemination of agricultural advances to farmers.

The goal of Khan et al. (2017) was to ascertain how well agricultural information and communication centers (AICC) convey technologies to Bangladeshi farmers. Important factors that can influence farmers' perceptions of AICC's efficacy were also noted. Using a pre-tested questionnaire, 100 users of agricultural information and communication centers in five subdistricts of Bangladesh's Mymensingh district participated in the study. Both descriptive and inferential statistics were used to evaluate the data. Most farmers said that agricultural information and communication centers were either poor or useless at spreading agricultural knowledge. Therefore, there ought to be ample opportunity to improve the caliber of services provided to farmers. The aforementioned findings should also be taken into consideration by extension policymakers, who should train users in information and communication

technology, build infrastructure for information and communication technology, maintain suitable center facilities, and address other issues that affect the sustainability and efficacy of agricultural information and communication centers.

In order to assess the benefits of extension services on farm productivity and income, Danso-Abbeam et al. (2018) investigated agricultural extension and its implications on farm productivity and revenue in Northern Ghana. 200 farm households in two districts in the northern part of Ghana provided cross-sectional data for the study. According to the study's conclusions, participating in agricultural extension programs has a positive financial impact. In addition to the primary socioeconomic variable, the estimating technique indicated that institutional and farm-specific factors significantly influenced farmers' farm income. This study has highlighted the role that extension programs have in increasing household income and agricultural output. Therefore, prompt hiring, agent training, and sufficient logistics should be used to increase the delivery of agricultural extension services.

Bushara et al. (2018) examined the economic impact of technical output packages on Khartoum potato production by focusing on the adoption and impact assessment of improved potato crop production systems in Khartoum state, Sudan. Data for the study was gathered from 192 farmers who were dispersed over four sizable potato-growing communities using structured interview questions, interactive group discussions, and personal observation. According to the study's findings, land ownership, extension services, official and informal financing, and potato revenue all improved the well-being of potato farmers in the areas examined. Additionally, many farmers adopted recommended agronomic field methods, but only after an authorized institution demonstrated the technologies' and techniques' viability in the agricultural sector.

In this study, Dhehibi (2020) evaluated the effectiveness of various agricultural technology diffusion techniques applied in the livestock–barley system in semi-arid Tunisia, as well as the dependability of information sources on two improved agricultural and livestock technologies, barley variety and feed blocks. For the study, 671 smallholder farmers provided primary data. To classify and evaluate the effectiveness of the several technical diffusion approaches utilized by the Tunisian extension system, a descriptive statistical analysis was conducted using Kendall's W-test and the chi-squared distribution test. The results of the study show that although knowledge transfer methods have been enhanced to encourage smallholder farmers to accept new technologies, the adoption rate of the two technologies is still low, which affects the performance and economic sustainability of the farm. This is in spite of the substantial evidence supporting the technologies' positive effects on the economy and the environment, as well as the effectiveness of the project's cost-of-diffusion models.

Discussion and Contribution Statement

Significant observations were made and applied when reviewing previous research on the significance of agricultural extension programs in technology transfer for rural farmers. Prior research was used to design the research objectives, methodology, and participation measurement scales. Previous studies demonstrated the dearth of research on agricultural extension and agricultural extension program management in organizations, specifically in the areas of technology transfer and farmer production processes. While statistical methods ranged from descriptive tools to inferential tools, most studies relied on preferred questionnaires and in-person interviews to gather data. Data were described using the following terms: variance, regression, Chi-square, simple correlation coefficients, frequencies, mean, and percentages. In order to focus on transferring new technologies to farmers through agricultural extension program management in the rural area, the researcher was able to choose a few parameters as independent variables that were anticipated to affect technology transfer, agricultural extension program management, and encouraging farmers to adopt and use new technologies in their farm field practice.

Similarities and Differences of the reviewed studies

In order to effectively manage extension service programs and projects, extension staff, networks, collaborations, and partnerships with stakeholders in the agriculture industry, as well as—above all—managing farmer relationships to foster trust and an environment that facilitates the delivery of extension services, Lopokoiyit et al. (2013) demonstrate the importance of extension management. This suggests that the administration of extension programs is essential to most aspects of raising farmers' output. According to Danso-Abbeam et al. (2018), who show the beneficial economic effects of taking part in agricultural extension programs, having a controlled agricultural program helps farmers increase their output and revenue. Additionally, agricultural extension is the basis for transferring agricultural technologies to farmers and convincing them to adopt new agricultural techniques, according to Altalb et al. (2015). As a result, agricultural extension workers are essential in this process. This is comparable to (Dhehibi, 2020), who shows that, despite substantial evidence of the economic and environmental advantages of new technologies as well as the effectiveness of the project's cost-of-diffusion models, smallholder farmers' adoption of these technologies has improved due to improved information dissemination tactics.

However, Baig and Aldosari (2013) found that during the past 20 years, the extension system or service in many Asian countries has not been able to have the required

impact, assist farmers in overcoming their obstacles, and provide them with better and better alternatives. This contrasts with the findings of (Lopokoiyit et al., 2013), who noted that extension management is essential for overseeing extension service projects and programs, extension personnel, networks, partnerships, and collaborations with stakeholders in the agriculture industry, and—above all—managing farmer relations to foster trust and an environment that facilitates the delivery of extension services.

Conclusion

In conclusion, by encouraging farmers to embrace new agricultural technology to enhance their output and improve their economic and agricultural productivity, agricultural extension programs significantly influence the spread of knowledge and technology transfer to farmers. The management of the program assists rural farmers in learning about the latest technologies and the benefits of applying them in their daily lives. According to the reviewed studies, the agricultural extension system serves as a conduit between farmers and agricultural research institutions. It is undeniable that rural farmers who use agricultural technologies and techniques are greatly impacted by well-managed programs and competent extension system staff. The management of agricultural extension programs, which is essential for the development of rural areas through rural farmers and their families, appears to receive insufficient attention in some nations. In order to make the best choices, the government must appoint some competent and skilled agricultural extension workers and put the right person in the right position, such as a managerial one. The manager must be able to create and formulate an active strategy and develop a program management for bringing new technologies to rural farmers.

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