

AGRICULTURAL EXTENSION, TECHNOLOGY DEVELOPMENT AND TRANSFER POLICY IN NIGERIA

By

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Abstract

This paper presents a discussion of challenges facing agricultural extension services in Nigeria and a suggestion for enhancement. The study provides a reality check regarding scarce resources, poor structures and infrastructures, and inefficiencies in delivering extension services to farmers. More funds affect the selection and appointment of the right extension agents, hindering training and restocking with appropriate tools and equipment. Time delays in service delivery and knowledge non-sharing at key levels of the value chain can also be blamed on the available but poor transport, communication, and storage infrastructure. Multidisciplinary coordination between researchers, extension agents, policymakers, and farmers is also characterized by an information deficiency and relatively ineffective service delivery. To address these challenges, this study recommends increased financing of extension service delivery and infrastructure, especially in transport infrastructure, communication, and storage. Furthermore, coordination structures should be emphasized so that institutional cooperation, learning, and decision-making aspects can be strengthened and enhanced for farmers. These realizations will afford the policymakers, researchers, and practitioners to

provide the necessary support/requisite boost/boost required to farmers and the agricultural productivity towards the required sustainable development in Nigeria.

Keywords: Agricultural Extension Services, Infrastructure Challenges, Service Delivery. Coordination and Collaboration, Sustainable Development

Introduction

Extension services are a central factor in technology generation and technology transfer in agriculture (IFAD, 2019). Extension services and technology transfer policies in Nigeria, a country endowed with great agricultural land and massive potential in the agricultural sector, can go a long way in contributing to food security, rural development and economic growth in Nigeria (World Bank, 2020). The focus of this paper is to critically evaluate the strengths, weaknesses, and opportunities for improvement of the agricultural extension, technology development, and transfer policy practised in Nigeria.

Nigeria urgently needs agricultural extension services. The country's vast population is involved in agricultural activities for income and food security; hence, modern technologies and innovative farming practices can go a long way in improving the production and efficiency of sustainable agriculture (FAO, 2018). However, technology transfer and adoption depend on extension services linking researchers, policymakers, and farmers (Akande et al., 2017).

Challenges facing the current agricultural extension system in Nigeria include, in one way or another, hampering its capability to facilitate technology development and transfer. Restriction in funds, poor-infrastructure-endowments and scarce availability of well-qualified professional extension agents have rendered extension services as least

optimum, thereby failing to deliver awareness and progress to the farmers at par time. In addition, there needs to be a well-defined and coherent technology transfer policy framework, thereby expanding the aforementioned challenges and resulting in an incoherent and ineffective flow of technology (Olayiwola et al., 2018).

This paper will rely on government publications, peer-reviewed articles, and policy papers to gather information necessary to provide complete coverage of Nigeria's agricultural extension, technology development, and transfer policy.

This paper will be organised as follows: First, some basic background information on Nigeria's current agricultural extension system will be outlined, together with its positive and negative aspects. Secondly, a review of current technology development and transfer policies will be undertaken to evaluate the suitability of such policies and define recommendations for change. Last of all, suggestions will be made to increase the efficiency of the agricultural extension services and technology transfer policy in Nigeria based on the successful activities of other countries and potential requirements in Nigeria.

As such, this paper seeks to contribute to the debate on developing agriculture in Nigeria by critically evaluating the nation's agricultural extension, technology development, and transfer policy. The findings of this study will be helpful to policymakers, researchers, and development practitioners interested in achieving sustainable agricultural development and its normative outcome of improved living standards of the farming populace in Nigeria.

Problem Statement

As highlighted by the World Bank (2020), Nigeria faces many challenges regarding technology transfer and objectives, such as the effectiveness of the extension agents and regulations. According to Olayiwola et al. (2018), the existing policies require enhancement; technology investment and funding are inadequate; therefore, technology development needs to be more cohesive. New techniques receive even less physical support and interprofessional collaboration than others (Adewale et al., 2019). These are problems that must be solved to address the concerns of food security and rural development and the potential in the agricultural sector. Consequently, this paper offers some recommendations to improve Nigeria's agricultural extension system.

Aims and Objectives

Aim:

This paper aims to enhance the effectiveness of agricultural extension services and technology transfer policies in Nigeria.

Objectives:

1. Assess Nigeria's current state of agricultural extension services, identifying their strengths, weaknesses, and areas for improvement.
2. Evaluate Nigeria's existing technology development and transfer policies, analysing their coherence, coordination, and impact on technology dissemination.

3. Identify the key challenges and barriers faced by agricultural extension services in Nigeria, including limited funding, inadequate infrastructure, and a lack of coordination among stakeholders.

4. Propose recommendations and strategies to strengthen agricultural extension services, considering best practices from other countries and tailoring them to the specific needs and context of Nigerian agriculture.

Literature Review

Agricultural Extension: An Overview

The problems encountered, and potential solutions to the agricultural extension services in Nigeria were described and explained aptly in the conceptually driven paper by Adewale et al., 2019. As highlighted by the researchers, their study observed several major organizational concerns as significant impediments to enhanced extension service delivery. First, it is almost impossible to allocate sufficient funds for extension, as the issue is seldom provided with money. The most significant of these among them is the financially related difficulty in recruiting and nurturing enough qualified extension agents to adequately help to counter the current research–cum–legislative actors' deficit with farmers.

Another challenge Adewale et al. (2019) identified as needing better provision is inadequate infrastructure. Extension services cannot effectively and timely be conveyed to rural farming communities because of poor transport means, communication channels, and storage. This infrastructural scarcity is the reason for the modest scope of extension operations and its challenges to technology transfer.

One other challenge highlighted was the insufficient number of extension agents. According to Obiora (2014), training programmes to increase the competency, expertise, and capacity of the extension workers are needed seriously. For farmers to be able to accept new technologies, extension agents must be empowered with information and materials to pass the information to the farmer.

In a related study, Akande et al. (2017) discovered the role of Nigerian agricultural extension service employers in conveying innovation significance. They noted that their study showed how the joint efforts of the extension agents, researchers, and farmers proved crucial in the dissemination of the technology. Modern practises and inventions in this field can only realise the intended impact when there is coordination with all stakeholders.

PRA meetings and workshops, which convene researchers, farmers, and extension agents, are required for improved coordination Akande et al. (2017). Significant factors in efficient technology transfer are the information and experience exchange and the discussions they stimulate in these venues. Research can more effectively align their work with realistic demands, extension agents can better understand what farmers need and what challenges them, and farmers can receive targeted recommendations and assistance because of more effective cooperation.

Opportunities and challenges for agricultural extension services in any country are often present, and the evaluations performed by the teams of Adewale and Akande also consider these aspects. Their research emphasises that increased cohesion is required in their sector and that addressing such issues as finance, facilities, and training is crucial. With these issues in mind, those involved in practice in Nigeria could at least enhance

extension service delivery for the extension and adoption of agricultural technology, which in the long run would help to enhance the agricultural sector in Nigeria.

Technology Transfer Policies in Nigeria

Afarayemi-Bojaleh et al. (2017) and Olawumi et al. (2019) reviewed the domestic policies surrounding technology transfer in Nigerian agriculture as comprehensively brought out by Olayiwola et al. (2018). One of the main challenges that their work highlighted was that a unified and coherent policy approach needs to be implemented. A part of the poor funding and distribution of agricultural technologies by NGOs and other international organisations is that there needs to be a coherent and well-coordinated policy on the agriculture sector on the part of the Ugandan government.

Olayiwola et al. (2018) asserted the need for an effective policy framework in managing technology transfer. Technology development, adaptation, adoption, and diffusion are all components of an ideal policy that would depict a roadmap for everyone involved in technological advancement (Shenkoya & Kim, 2020). Technology diffusion deficiency is experienced once the researchers, the extension workers, the legislators, and the farmers cannot synchronise their activities because they do not have such a framework.

Also, and more specifically, the World Bank developed a policy note in February 2020 focused on agricultural innovation and technology transfer in Nigeria. Their research also emphasised that more investment, better coordination mechanisms, and stronger Institutions are essential to encouraging successful technology transfers.

Measures of Institutional Assurances: As mentioned in the policy note of the World Bank, sound institutions shaped the free flow of technology transfer schemes. In order to do this, seamless communication and collaboration among a myriad of institutions

must be fostered: research institutions, extension services, and businesses and industries (Oyinbo et al., 2020). By strengthening institutional structures, technology can be transferred with a measure of integration and coherence by which its dissemination becomes more effective overall.

Moreover, the study advised all the players involved in technology transfer to enhance coordination in technology transfer. This requires mechanisms for disseminating information and literature review, provision of and sharing of ideas among members of a practise area, available consultants' calls and consultations, and cooperation, frequently among each other as often as necessary for the most successful practice. As noted in the policy paper, enhancing coordination was seen as a viable way of optimising coordinated human and material resources. This might result in a properly directed and effective technology transfer in Nigerian agriculture.

Finally, the need to fund technology transfer initiatives was proposed in the policy paper. Investment in research, development of human and physical assets, input towards infrastructure development, and field extension programmes all involve using appropriate financial resources. Since it enhances innovation, boosts the agricultural sector and guarantees continued success, the enhancement of technology transfer is critical to sustainable agricultural growth and development in Nigeria.

Olayiwola's report and the World Bank's policy note highlight the importance of a well-rounded regulatory framework, more robust institutional structures, better coordination, and more investment in facilitating successful technology transfer in Nigerian agriculture. These details may help policymakers advance innovations, improve technologies in agricultural practices, and ensure further development.

Challenges and Barriers

In order to improve agricultural extension services, it warrants being informed of the difficulties they encounter in the Nigerian instance. Several critical challenges were revealed, such as insufficient physical infrastructure, low coordination of the stakeholders on a higher level, and low finance, according to the IFAD (2019) study of the barriers mentioned. The IFAD report described how such barriers must be overcome to unlock the potential of the services provided through extension. Using the information given by Agbarevo (2013), it is clear that the main problem that prevents extension operations from obtaining the kind of assistance they need is the question of limited funds. Shortage of funds impacts the quality of the extender agents that can be hired, the efficiency of training and development programs to be initiated, and the procurement of implementing tools and gears (Oyinbo et al., 2020). This problem can only be solved if well-funded agricultural extension services are appropriately prioritised. It will only then enable it to support the farmers and transfer new knowledge and innovations to them.

Besides, a weak framework to support extension services also manifested as a challenge in delivering knowledge on improved farming practices to producers. Jensen et al. (2014) examined the role of infrastructure in facilitating the transfer of such agricultural technology in Nigeria, as cited in Nwachukwu et al.(2016). They emphasised the need to solve problems of transport, communication, and storage. Extension agents cannot give timely info and technical support to remote areas such as rural areas because of poor transport systems. Stakeholders and employees are limited in how much information is shared and their capacity to collaborate, mainly because of the need for proper communication infrastructure. The quality of agricultural products cannot be maintained or can hardly be preserved because the requisite storage facilities are not available (Agbarevo, 2013). Problems related to infrastructure include inadequate road

network, telecommunication technology, and storage infrastructure, which should be addressed with priority changes to achieve the company objective (Camillone et al., 2020). These enhancements are critical for the timely and efficient delivery of change in agricultural matters and will ensure the timely delivery of critical resources and help to farmers.

Other challenges mentioned included a need for coordination between stakeholders, another one on the list. Interactions Connectivity between a researcher or a scientist, an extension agent, a legislator or representative, and a farmer must be perfect for technology dissemination and extension services to bring out the intended results (Oyinbo et al., 2020). The crosscutting facilitation mechanism, which is the foundation that facilitates the exchange of information, knowledge, and decisions, was highlighted by IFAD. However, to achieve the intentions set for providing agricultural extension services, all the stakeholders must surely harmonise and refrain from duplication.

If agricultural extension services are to be enhanced in Nigeria, then these handicaps and challenges need to be addressed. There is potential for farmers and the knowledge and tools needed for sustainable agricultural development if policymakers commit sufficient resources, enhance the physical infrastructure and foster multi-stakeholder participation (Agbarevo, 2013).

Theoretical Framework

Diffusion of Innovation Theory

One theory that aligns with the study is Everett Rogers's "Diffusion of Innovations" theory. This theory covers how innovation, technology, or practice is rehearsed and embraced within the given populace or social structure. Applied to the domain of agricultural extension, technology transfer, and adoption within the Nigerian

agricultural sector, this theory will aid in understanding how innovations in the form of new agricultural practices and technologies and related policies are disseminated, adopted, and incorporated.

The theory aligns perfectly with this study. This theory focuses on how new ideas, technologies, or practices spread and are adopted within a population or social system. In agricultural extension and technology transfer, this theory can help understand how innovative agricultural practices, technologies, and policies are introduced, accepted, and implemented within the Nigerian agricultural sector.

Methodology

This study used secondary sources and web data to investigate Nigerian agricultural extension services' challenges. The researcher searched trustworthy websites, publications, and reports to understand the issues. These findings should bring useful information to these issues because they resume existing knowledge and information.

While secondary sources and internet data proved convenient, this work had limitations. Other limitations include the availability of adequate sources, imprecision in internet data, and biases and cognitive gaps in present knowledge. However, the given practical research aimed at was attempted to provide a complex analysis of the work.

Findings

With these specific findings, this research work has improved the range of challenges in the agricultural extension services in Nigeria (IFAD, 2019; Nwachukwu et al., 2016). The degree of funding was a limiting factor that impacted the accessibility of extension assets needed for implementation (IFAD, 2019). This reduces the ability to grow highly qualified extension agents, the chances of providing supportive training interventions,

and the chances of offering fundamental inputs and equipment (IFAD, 2019). This aspect is still a significant concern in the delivery of extension services as well as the overall capacity of the sector to meet the diverse demands of farmers.

Inadequate and poor general infrastructure also constrains delivery of good agricultural extension services (Nwachukwu et al., 2016). The study revealed transport, communication, and storage facilities transport by Nwachukwu et al. (2016). In target regions, poor transport infrastructure that needs to be better maintained and lacking infrastructure significantly delays the provision of extension services to farming communities (Nwachukwu et al., 2016). Severely restricted communications demechanized the sharing of essential information and knowledge between stakeholders, affecting the spread of appropriate practice and improved knowledge (Nwachukwu et al., 2016). Additionally, poor storage infrastructure impacts how produce can be stored and retained in sound quality to help the farmers as they lose agricultural produce through ineffective preservation methods (Nwachukwu et al., 2016). These constrain the infrastructure of the extension services, thereby decreasing the success rate of the extension services and, in extension, the sector's efficiency.

The second significant knowledge gained from the research is the disorganisation of stakeholders as a significant challenge towards the efficient delivery of agricultural extension services (IFAD, 2019; Nwachukwu et al., 2016). Due to the extensive fragmentation of the actors who provide services for enhancing research extension linkages, there are several gaps and overlaps in service provision (IFAD, 2019; Nwachukwu et al., 2016). This study pointed out the need for optimal processes for distilling, transferring, and managing knowledge among and with those stakeholders regarding timely and accurate decisions (IFAD, 2019; Nwachukwu et al., 2016). Improvement of the existing coordination mechanisms would improve the

synchronisation of the extension services, reduce the setup of duplicative initiatives, and improve the effectiveness of extension services in developing agriculture in Nigeria.

Thus, it is possible to stress the urgency of overcoming the mentioned barriers to improve Nigerian agricultural extension services (IFAD, 2019; Nwachukwu et al., 2016). As research shows, extension requires corresponding support and funding to sustain its operations and activities (IFAD, 2019). In the same regard, investments in transport, communication and storage structures would go a long way to facilitate service delivery and dissemination of knowledge (Nwachukwu et al., 2016). Additionally, improving the institutional and organisational relations and linkages among the stakeholders will enhance interactions, experiences exchange, and improved and more consistent decisions (IFAD, 2019; Nwachukwu et al., 2016). Only when these challenges are met adequately can all the relevant stakeholders, policymakers, researchers, and practitioners effectively implement measures that help establish an environment that supports farmers, enhances agricultural production, and fosters sustainable development in Nigeria's agricultural sector.

Recommendations

The following recommendations can be made regarding the challenges experienced by agricultural extension services in Nigeria, as informed by this study.

1. **Increase funding:** Sustained and adequate support for extension activities is needed. This will require adequate and sustainable funding. Government and other development partners should increase investment in the provision of extension services required for training, extension inputs, and facility development. This will make it easy for the extension agents to offer quality services and access the farmers' needs and wants.

2. Improve infrastructure: Extension services are an important constraint due to the limitation of infrastructure; therefore, the development of transport networks, communication, and storage facilities is crucial. Governments should budget for infrastructure development and better access through constructed roads and bridges that will ensure timely and efficient delivery of extension services amidst the many years of distance to some farming compartments. Also, better communication infrastructure, including Internet connection and mobile devices, will enhance information flow and knowledge sharing between interested parties. In addition, constructing new storage structures with respective enhancements will reduce losses after harvest and quality degradation of the produce.

3. Strengthen coordination mechanisms: Lack of coordination amongst the stakeholders becomes a pertinent challenge that must be effectively managed to deliver agricultural extension services properly. Local, regional, and national governments, research organisations and institutes, extension agencies, Farmers' associations and groups should collaborate and form working relations to enhance information sharing and decisions. This can be done through meetings, workshops and conferences. This will enable the extension of the exchange of information and set out work plans to ensure no overlapping activities.

4. Enhance capacity building: The extension agents should be trained and placed through social capacity building practises for constant skill and knowledge improvement. This ranges from providing them with updated information in agriculture to practising new techniques, new methods, and technological changes. Furthermore, there is also a need to enhance the communication and advisory competence of training programmes to better respond to the needs of farmers.

5. Promote farmer participation: It is important to engage farmers in the planning, execution, and assessment of extension services. Governments and extension agencies must seek farmers' views on the extension programmes that they wish to develop to ensure that their needs are met. The above approach will make extension initiatives more practical, increasing the utility of extension services at the grassroots.

Conclusion

It can be asserted that agricultural extension services in Nigeria work under great but devisable challenges. The extension industry has failed to meet the diverse needs of farmers due to reasonable constraints in terms of capital, resource mobilisation, and breakdown of coordination to provide extension services as required.

However, it must be stressed that these are problems and can be addressed or conditions improved for agricultural extension services if the above suggestions are to be carried out. Additional funding will also be achieved through better transport, communication, and storage services to enhance service delivery and knowledge sharing. This paper found that improving extension services requires improving the coordination systems to ensure that the various actors are aligned in delivering the services. This will bring teamwork, information exchange, and decision-making processes among team members.

Combining efforts in these measures will ensure that researchers, practitioners, and policymakers in Nigeria's agriculture sector develop ways to improve farmers' capacity, production, and development. The issue here is that the true potential of agricultural extension services through which farmers stand to gain, as well as the development and growth of Nigeria's agricultural sector, can only effectively succeed if all the above barriers are addressed.

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