



Perspectives on communicating 21st-Century agricultural innovations to Nigerian rural farmers

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ABSTRACT

This perspective paper reviews the existing research directions on agricultural extension programmes in Nigeria and highlights how they are incapable of diffusing enough knowledge to facilitate the adoption of 21st-century agricultural innovations and enhance sustainable practices among rural farmers. A key idea of this paper is to suggest a new direction of research that is oriented towards the quality, skills, and strategies of effective and efficient communication that the extension agents possess, and a two-way communication delivery, and accentuate how it is a panacea for effective diffusion of knowledge and adoption of agricultural innovations among rural farmers. The methodology was to review and compare bodies of literature from countries with the best agricultural extension and rural advisory services, particularly some countries in Asia, and show how insights from those countries can inform a new research direction in effectively communicating agricultural innovations to Nigerian rural farmers. Drawing on experiences from those countries, it was confirmed that Nigeria's extension system is not effective and efficient in communicating innovations in global agricultural practices to farmers in the rural areas, and research efforts in extension services in the country are still fixated on the role of extension agents as teachers to *farmer-pupils* and one-way communication delivery from research through extension to farmers, and the availability and ability to use communication channels. Based on the current challenges in farming and agriculture at large, there is a need to rethink the concept of extension in Nigeria, emphasize training of agents, acquisition of communication skills and adoption of a two-way communication delivery that recognises farmers as autonomous agents and co-designers of agricultural innovations and not just passive receivers. The value of this paper is that it is arguably the first attempt to chart a new perspective and communication delivery methods for research and practice in agricultural extension programmes in Nigeria.

1. Introduction

Innovation in agricultural practices and systems is a key component of the global economy in the 21st Century [[1,2]], and they are driven toward the enhancement of food security, nutrition, and health [3], which are the core of SDG 1, 2 and 3 [4]. Access and adoption of innovations define food production and availability nowadays. Researchers have concluded that some of the challenges facing the agricultural sector in Nigeria include a lack of access to innovations such as improved agricultural technologies, for example, land preparation, protection, marketing, and value-addition facilities [5]. Other challenges include desert encroachment, deforestation, climate change [6],

lack of efficient transportation and storage capacity [7] bringing about to post-harvest losses [8], poor credit facilities [[9,10]], poor irrigation, reduced soil fertility, poor seed quality [11], and many more. There is also evidence that, regardless of the challenges mentioned above, the inability to facilitate the adoption of existing innovations and enhance sustainable practices has also plagued the agricultural sector in Nigeria [1]. These are the reasons for the persistent problem of deepening food crises in Nigeria [[12,13]]. As a result, Nigeria remains a net importer of food [13], even though the country ranks 13th in the world in the availability of agricultural land with 70.8 million hectares [14]. Data gathered between 2016 and 2019 indicate that, with a cumulative agricultural import standing at 7,530, 786, 600USD and export at only 1,

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809, 636, 780 USD, Nigeria has seen a massive increase in food imports as a result of the population rise and declining food sufficiency [3].

Having enumerated some of the challenges of agricultural development in Nigeria and the reasons for the deepening food crises, it is instructive to understand that sustained agricultural growth and development that will facilitate better living conditions does not predominantly depend on the supply of a series of technological inputs but essentially in pursuing a deliberate rural education and development policy that can improve the living conditions of the rural peasantry [15]. That policy must have at its core the spread of useful information to farmers in the form and language that can be easily understood and internalised by them. Based on that evidence, it could be inferred that the problem of the food crisis in Nigeria is not only caused by lack of access to modern technology, paucity of government initiatives and agricultural innovations in the 21st century but there is a persistent problem of effectively spreading useful and workable agricultural information to rural farmers in the most effective and efficient form and language [16]. This has inspired frenetic efforts among researchers to look for ways to integrate the knowledge of agricultural innovations and technological inputs into farming practice in rural areas. Inference from research have indicated the importance of effective communication in achieving the goal of enhanced agricultural production and productivity [16]. That is where the extension and advisory services come in as their job is to communicate new knowledge and technologies from research to farmers and end users [17]. Extension and advisory services are a critical cog in the adoption of agricultural innovation, and have been shown to increase agricultural productivity, and reduce hunger and poverty [18].

At present, Nigeria has elaborate agricultural extension and advisory services, even though it pales in comparison to highly successful extension systems in the world, particularly some countries in Asia which have the largest and most successful extension systems in the world [18,19], and Europe and North America which have the best extension models, the number of extension agents and specialised extension training programmes [18,19]. Meanwhile, there have been a wealth of research results on agricultural extension programmes in the country [20–22], and the role of extension workers in using communication to integrate knowledge and enforce innovation has also been accentuated in many studies [5]. But the major snag is that most of the studies on the dissemination of information on agricultural innovations in Nigeria have failed to emphasize the skills, competencies and capacities of the extension agents nor move away from one-way information delivery towards two-way facilitation between farmers and research – which is the current thinking in extension research; rather those studies are mostly oriented towards types of communication channels used by extension agents, channel availability and ability to use them, channel access and preference [20,23–27], language of communication delivery [28,29], extension model used [30], and the complexity of the innovations [31].

There is no shortage of evidence to signpost the importance of communication in enhancing agricultural development in Nigeria [23,32]. However, if the knowledge gap must be closed up among rural farmers and the deepening food crises must be arrested, apart from providing access to modern agricultural technologies, the direction of research and policy initiatives must be on the communication-specific strategies that will facilitate awareness, acceptance, and adoption of numerous agricultural innovations of the 21st century. How well the communication is delivered defines the efficiency and effectiveness of the extension services in rural areas [27,33,34]. There is no doubt about the role of media channels in agricultural development [31], but as identified earlier, agricultural development in Nigeria is contingent on the spread of useful and relatable information to farmers in the form and language that can be easily understood and internalised by them. Therefore, researchers must address the form, skills, knowledge, attitudes, and ability of those who are charged with spreading agricultural information – researcher through extension agents – to share clear and utilisable information with the rural farmer.

It is disappointing to learn that communication skills are only considered fourth, by some researchers, in the order of consequence among the major constraints that affect agricultural development in Nigeria [33]. In the information-rich society of the 21st century, the quality of communication, particularly in discussing complex topics such as agricultural innovations, should always be a key consideration in agricultural development, and that is what previous research has often neglected [25]. For instance, Donye [28] suggested that discussions concerning the use of communication to drive agricultural innovations should be narrowed to how best to present the messages so that rural people can maximally benefit from these communication programmes.

Therefore, following a review of works of literature from other countries with more elaborate and successful extension and advisory systems in the world, this paper calls for increased research emphasis on the skills and strategies that the extension agent must adopt in communicating these innovations with the farmers in rural areas.

2. Perspectives and comparisons from other countries

The methodology of the perspective paper was to review and compare bodies of literature from countries with the best agricultural extension and rural advisory services, particularly some countries in Asia, and show how insights from those countries can inform new research, practice, and policy directions in communicating agricultural innovations to Nigerian rural farmers.

The global approach to agricultural extension and rural advisory services is changing, especially since the success of the Green Revolution in some countries in Asia [17,35]. However, the importance of communication skills and strategies in effectively discharging the mandate of agricultural extensionists and achieving the goal of enhanced agricultural production and productivity has remained universal and has become more pivotal in the 21st Century. Countries that have paid more attention to communication skills and delivery methods have greatly impacted agricultural productivity and livelihoods in their rural communities [21].

The success of the extension structure and approach in countries such as China, India, Indonesia, and other countries have accentuated the need for adequate communication skills in agricultural extension and rural advisory services. For instance, in those countries, agricultural extension is no longer that of a unified public sector service but of a multi-institutional network of effective knowledge and information support for rural people [36], and agents receive advanced training on knowledge and information transfer. On the other hand, in Nigeria, more than 95% of the services are still government-funded and use the Training and Visit (T&V) model even though it lacks financial sustainability and is inadequate in meeting the demand of farmers [30], and evidence reveals that some states in Nigeria have gone over 30 years without training their extension agents [37].

In the 21st Century, the role of extension agents has been redefined to acknowledge the importance of involving farmers in communication delivery. In a regional conference for Asia and the Pacific, FAO [38] identified the expanding coverage of participatory approaches in extension in the continents, and noted that client participation and empowerment have become a precondition for ensuring the sustainability of extension initiatives. More so, the concept of communication has shifted from a message- and target-oriented audience approach to a concern for the quality of the interactions [39]. In planning extension communication, there is growing recognition that the primary driver of extension services is the needs of the farmers and the market. Therefore, as Swanson [18] found out, ineffective extension systems in the world, audience, and market analysis have been systematically deployed in planning extension communication. But countries such as Nigeria, Malawi, Mali, and Honduras, to name a few, do not pay enough attention to functional skills such as communication [40]. Their extension systems are limited by the lack of instructive elements such as effective communication in their curriculum, especially in Mali [41]. But

evidence shows that in some countries in Asia, for instance in Vietnam, there is great attention to communication skills and approach, and the quality and relevance of information. In some countries in Central Asia and the Caucasus, there has been a recently growing emphasis on functional skills to communicate effectively among extension staff. The emphasis is on establishing better communication as a key strategy for effectively reaching the target audience [42].

3. New perspectives in Nigeria

Based on the experience of some countries in Asia that have enjoyed successes in agricultural extension and rural advisory services, and the current thinking in extension services all over the world, it is important to begin to redirect discussions and research on agricultural extension in Nigeria toward the quality, skills, competencies and strategies of effective and efficient communication that the extension agents possess [43], and the involvement of farmers in the communication design and delivery. These perspectives will be situated under this section.

3.1. Importance of efficient communication among extension agents in Nigeria

Communication is the crux of all extension activities in research and linkage to farmers, hence it seems misplaced that lots of research attention have rather been domiciled on media-related variables, the complexity of innovations and the availability of extension agents, with scant attention on the quality of communication and the strategies that the extension agents are employing in driving home these innovations and facilitating adaptation of the complex new agricultural technologies [44]. Communication skills are considered the most desirable skills in agricultural extension [45]. New agricultural innovations will always give rise to being confronted with new communication tasks, and this will require requisite communication skills and strategies [46]. Therefore, good agricultural extension will always be predicated on communication skills and in-depth knowledge of the extension agent [43]. The communication skill level of agricultural extension agents has been positively correlated with the level of agricultural development in any society, and the skills were found to arise from training and relating with farmers to know their problems [47]. Research findings suggest that the needs and preferences of professionals in the agricultural industry and stakeholders in agricultural communication are always changing and the extensionists should regularly review their skills and competencies [48].

Tilda et al. [49] assessed the competence level of extension workers in a Northwestern state in Nigeria and identified poor communication with farmers as one of the weaknesses facing extension services in Nigeria. The study indicated that more than half of the extension agents did not have a university education and were average in professional competencies such as communication skills. In a related study [50] carried out in a Southwestern state, it was found that as high as 25.8% of extension agents did not have any formal education and only 12.1% had tertiary education, and it has been previously established that the level of education that extension agents receive affect their communication competence [51]. Correspondingly, Udemezue [52] found that much of the extension information in Nigeria is out of date, irrelevant, and not applicable to smallholder farmers leaving them bereft of information and resources that they need to enhance productivity. This calls for renewed attention among researchers, educators, and policymakers to the quality, skills, and strategies of effective and efficient communication that the extension agents in Nigeria possess.

3.2. Training extension agents for content and practical skills in the communication delivery

In communication, evidence shows that content and practical skills of delivery override other elements in the communication process.

Communication is only considered effective if understanding is established, the substance of the message is decoded and appreciated [53], and the desired effect is achieved [54]. The prevailing channel, access, preference, choice, and other variables relevant to the communication of extension messages in the rural areas in Nigeria have been established, but how are the messages delivered? It has been found that one of the problems of agricultural development in developing societies is that extension service providers are not often adequately trained for effective communication [3,43]. Training on the strategies for effective communication of agricultural innovations and adaptation of the complex new agricultural technologies should be part of the new direction of research. The need for capacity building has always been suggested to develop the technical skills of extensionists and improve their communication skills [21].

More so, the agents link farmers with research institutes by forming a conduit for the transfer of innovations and research findings. As a result, their role is to ensure that farmers receive important information, and to do so effectively, they must be trained and equipped with appropriate resources to deliver the message [21]. This point of view had been echoed by studies that maintain that the communication skills of the agricultural extension agent are a strategic asset to improving the adaptive capacity of farmers [55,56], and to acquire those skills, training workshops on communication strategies are advised [21,57].

There is an indication that policymakers are not paying sufficient attention to training extension agents in Nigeria. Empirical evidence revealed that public spending on extension services in Nigeria mostly goes to salaries, leaving limited resources for operational expenses which ultimately results in inadequate training in functional skills and a lack of motivation [30]. It has been found that significant factors affecting extension agents' involvement in disseminating agricultural initiatives are educational qualification, years of experience, and participation in training. Because of the paucity of these factors among extension agents in Nigeria, there is still a wide range of initiatives that are not adequately disseminated to rural farmers [58]. This has inspired calls for the training of extension agents on a wide range of agricultural initiatives to scale up the adoption of those initiatives by rural farmers and enhance food security in Nigeria [49,58], and the regularity of the training is important [59]. It has been found that training and retraining of extension agents in Nigeria in communication skills will enable them to give their best services to rural farmers, empower them to meet farmers' needs, and help the farmers improve their food production capacity [52].

This does not take away the fact that Nigeria has the largest agricultural research system in sub-Saharan Africa with Agriculture Departments in 18 national universities, 17 commodity-based research institutes, an international Agricultural Research Centre, the National Agricultural Extension Institute, three specialised Universities of Agriculture [60]. But this does not seem to reflect the quality of training received in the agricultural extension system in Nigeria as the extension system is still generally weak in the country [61].

3.3. Communication competences of extension agents

A key strategy that should be of concern is that the extension agent should adopt the competency of a public speaker, which inexorably involves preparation and practice; putting some care into the content of the communication in terms of words, expressions, and logical sequence; delivery with scanning the audience faces, confidence, friendly style, sensitivity to the effect of the communication, positive, and relatively brief; and encouraging feedback from the audience [62]. Effective extension programme needs agents who are well-appointed with an adequate understanding of communication principles and possess a flexible repertoire in public speaking [46] (See Fig. 1).

The inference is that innovations and new technologies are redefining the 21st-century agricultural landscape, and only extension agents who are adept at high-quality communication principles will be able to



Fig. 1. Landmark University Extension agent explaining soilless agriculture © Landmark University CPA.

effectively drive the diffusion of these innovations and new technologies. The core of this strategy is to effectively communicate ideas, listen actively to the needs and problems of the rural farmers, observe, empathise with them, as well as provide and get critical feedback [63–65].

A related strategy that must underpin contemporary agricultural extension is that the communication must be built around the rural farmers' frames of reference. Frames are underpinned by certain experiences, knowledge, and assumptions [66] and they guide sense-making processes [67] by affecting how the audience attributes meaning to the communication. The implication is to understand the farmers' frames of reference and communicate to them on that basis. Knowledge of the frames of reference will help to resolve whatever ambiguities that surround the linguistic, cultural, psychological, and social characteristics of the receivers [68]. The farmer is the audience and is the most important variable in extension communication. The message must be adapted to the language and culture of the farmers otherwise the frame incongruence can result in unintended effects and potentially dysfunctional communication dynamics [69]. Effective language use, as a frame of reference, is an important approach in extension communication. The farmer must be comfortable and conversant with the language of communication. Bad choice of language can be a source of distraction to the message [70]. In rural Nigerian communities, communication effectiveness is not guaranteed if the message is delivered in the English language as it is not the first language in Nigeria. It is often better to deliver an extension message in the native language of the farmers or pidgin English.

3.4. Adoption of compatibility strategies by extension agents

There is also the compatibility strategy that the contemporary extension agent must take into account. Rogers [31] explains compatibility as the degree to which an "innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters" [p. 15]. The interpretation is that if innovation is well-matched with the needs of farmers, then uncertainty will decrease and the rate of adoption of agricultural innovations will increase [71–73]. The strategy spells that the extension agent should build communication around the needs of the farmers. It must be consistent with the values, experiences, and needs of the potential adopters of the innovation [74,75], and the communication needs should be transferred effectively as directly as possible without misunderstanding. Evidence shows that compatibility can be attained by listening to the

farmers' opinion and their needs; doing audience analysis days before the extension exercise to talk to farmers, understanding the physical and psychological characteristics of the farmers before communicating with them, and identifying key priorities through field survey, community consensus, interview, etc. [76].

Extension programmes in Nigeria [77] and everywhere in the world [78] have undergone many changes over the years in response to the changing needs of farmers and the change in market dynamics. Nigeria, for one, is a multinational and culturally diverse state inhabited by more than 250 ethnic groups and 500 distinct languages [79] with diverse social and economic structures. The needs of farmers and the dynamics of the market in such a diverse society are different because they are affected by the farmers' location, and social and economic structures [78]. The implication is there is no universal approach for effective communication delivery in the extension system in Nigeria. But it has been observed that all agricultural institutions in Nigeria use the same curriculum for pre-service and post-service training of extension workers [60]. This calls for the need for educators to begin to tailor their training – and extension agents, their messages – to suit the needs of different farmers and the market dynamics in the location of each extension worker.

3.5. Farmer participation and rethinking agricultural extension through two-way communication delivery

Related to the compatibility strategy is the importance of farmer participation in extension efforts and feeding back the insights from the participation to the research sector, ultimately redefining agricultural extension, facilitating two-way communication between extension agents and farmers, and ensuring that innovations are better adapted and suited to the needs of the farmers. Research has shown that farmers and agriculture at large are facing new challenges which demand more participatory approaches to extension services [80,23,27]. According to Leeuwis (80), these approaches have led to rethinking agricultural extension in many ways, such as the concept of extension services evolving to the notion of communication for innovation which entails a departure from the emphasis on disseminating innovation to co-designing innovations with farmers; innovations now assume a collective dimension that requires co-ordinated action between the farmers and extension agents. More so, those innovations are relatable and actually work for the farmers.

The current extension direction involves the flow of information from farmers to extension agents and research workers [81,82]. (See



Fig. 2. Landmark University Extension worker entertains views of a farmer © Landmark University CPA.

Fig. 2) Agents exchange ideas, suggestions, or advice with farmers, and transmit them to research workers who will use the information to understand the problems and limitations of the farmers, and in the end, the research recommendations will be relevant to the farmers' needs. Therefore, recent studies have looked at extension agents, not as mere teachers to farmer-pupils but their primary role has extended to facilitating farmers' own discovery process by helping them to organise themselves and motivating them to take initiative and thrive in food production [83] (See Fig. 3).

However, much of the literature on agricultural extension in Nigeria still focuses on the one-sided communication between extension agents and farmers, neglecting the current thinking of farmers as autonomous innovation agents and as co-designers of innovation. There is still a lot of research attention on the communication channel, channel availability, access, choice and preference [[20,23–27]], extension delivery functions [84], the role of extension agents as teachers [44] and diffusers of innovation and that of the farmers as consumers of the innovation [58],

extension model used [30], and the types of innovations [31]. This calls for rethinking the direction of agricultural extension direction in a way that sees extension agents as facilitators of farmers' own discovery process, and farmers as co-designers of innovation.

3.6. Repeated exposure strategy

Repeated exposure is an important strategy for ensuring effective communication with the farmers, especially in a situation where innovation is complex and seemingly not consistent with what the farmers have practised for a long time. That mental discomfort as a result of exposure to innovation is what researchers have termed cognitive dissonance in communication. In theoretically explaining that Cacioppo and Petty [85] clarify that repetition and content of a persuasive message affect the sort and number of thoughts generated, and these thoughts, sequentially, affect the attitudinal response to the message. In corroboration, Nabi et al. [86] correlated repeated message exposure



Fig. 3. Landmark University Extension team meets women in agribusiness for technical capacity building. Facilitator communicates with the women in the outdoor session. © Landmark University CPA.

which occurs as a result of the prolonged communication campaigns, and the longevity of behavioural and attitudinal responses to the message. The inference to be drawn from that is that the key to ensuring that an innovation is adopted is to make sure that the farmers are repeatedly exposed to the same extension message. Repeated exposure could be applied by talking to the farmers more than once or supplementing oral group communication with audio-visual learning materials, phone calls, TV programmes, or any other channel that farmers can access in rural areas. The job of the extension agents is to establish behaviour change; that is, to deliver messages until there is a behaviour change in the farmers [87].

The extension agent, while providing a platform for repeated exposure to the message is wary of information overload and its adverse effects [88], and the negative emotions that it can portend which include being overwhelmed with too much information and having difficulty in decision making [89]. To not overload the farmers with information, Suvedi and Kaplowitz [90] explain that the extension agent keeps it simple and short and builds the message around a few things that are practicable and the audience can relate with. The extensionist is a critical element in all extension activities, and the success of the extension effort is dependent on how effectively the communication situation is handled; it is not on how imaginative the extension approach is nor the magnificence of the supply of inputs and resources [57]. The duty is on future researchers is to emphasize the evaluation of the knowledge and personal skills that the extension agent possesses.

The factors that have hindered prolonged rural field extension service and the longevity of behavioural and attitudinal responses to extension messages in Nigeria have been identified by bodies of research to include the absence of harmonised and coordinated efforts in research and extension activities, lack of depth of breakthroughs addressing specific demands of farmers and industries, poor funding of the extension system, shortage of manpower for consistent rural field extension, inefficient supervision of qualitative agricultural research and extension delivery [91,92]. This calls for consistent evaluation of extension efforts to determine where inefficiencies exist, increase funding of extension efforts, facilitate private sector involvement in extension services, identify institutional skill-gaps and expedite strong extension staff development.

3.7. Situating the new direction of communication delivery using communication theories

The recent debate of two-way communication delivery between farmers and research is supported by an existing spectrum of communication theories that maintain that the audience members are active participants in any communication situation [93]. The uses and gratification theory, in particular, tries to explain how and why people actively seek out specific media to satisfy their needs [93]. The theory diverges from other communication strategies that discuss what the media does to people; instead, it looks at what people do with the media [94,95]. It puts farmers at the centre of extension information facilitation as they have an opinion and ideas about the design of innovations they consider the best fit for them. In line with the theories of selectivity, people tend to expose themselves to a message that they feel agrees with their pre-existing attitudes, beliefs, and interests while avoiding the one that will create mental discomfort; they tend to remember best and longest, the information that is consistent with their interests and attitudes [96]. The takeaway of the theories is that the key variable to communicating effectively in agricultural extension situation is understanding the needs and interests of the farmers, and getting the to participate as active receivers and innovation agents.

4. Conclusion

Repositioning of agricultural extension service delivery in order to attain maximum utilization and enjoy its full benefits [24] has been long

overdue in a world where technologies are evolving rapidly and innovations are burgeoning in agricultural systems and practices, and the challenges of farmers are changing.

The bodies of evidence provided above show that part of the problem of agricultural development in Nigeria is that the innovations in global agricultural practices and systems are not effectively and efficiently communicated to farmers in the rural areas where the country has the largest concentration of farmers and arable land. This calls for careful reflection on the direction of research and practice in agricultural extension in Nigeria, and by extension, Africa. In the future, more attention should be given to the communication strategy and skills that are utilized by the extension agents in the delivery of agricultural messages to rural farmers. There is also a need to rethink the extension direction in Nigeria to reflect the current approach in two-way communication delivery and co-ordination of innovations among research, farmers, and extension.

The practical implication of this perspective is that extension agents should be intentionally and adequately trained in communication and facilitation skills [78,97]. There is a consensus that when the technical knowledge and communication skills of the extension agents are improved, agricultural productivity will improve [98–100]. More so, there should be a friendly policy to encourage private sector involvement in extension delivery to complement the effort of government. Furthermore, researchers and extension agents need to view farmers as partners, and not just pupils. The social implication is that the culture of participatory extension programmes should be enacted such that the farmer's interests and needs determine the content of the message. Communication effectiveness is always expedited when there is shared interest among participants [101].

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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