



ASSESSMENT OF COMPETENCY LEVEL OF AGRICULTURAL EXTENSION PERSONNEL IN NORTHWESTERN NIGERIA

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ABSTRACT

The study was carried out in Northwestern Nigeria. Multistage sampling procedure was used to select 306 respondents for the study. Primary data was collected via a structured questionnaire. Descriptive statistics and Principal Component Analysis (PCM) were employed to analyze the data. Results of the knowledge level of extension personnel on agricultural service delivery revealed that 90.8% of the respondents had a high knowledge on extension delivery. Results revealed that the overall competency level shows that 99.3% of respondents fell within the High Competency category (3.51 – 5.00). However, result on competency gaps among respondents revealed that there is weak competency in familiarization with community resources (0.448), understanding the concept of M&E (0.425) and knowledge of report writing among others. Results on constraints faced by respondents revealed that too many jobs with different specializations (97.1%) were ranked 1st among many constraints. It was concluded that addressing key gaps in competency would significantly improve the effectiveness of agricultural extension services in the region. Therefore, it was recommended that there should be a continuous professional development, particularly in familiarization with community resources, understanding the concept of M & E and knowledge of report writing, for extension personnel.

Keywords: Competency, Level, Gap, Extension, Personnel

INTRODUCTION

Competent extension personnel are the assets of agricultural extension services (Murari and Ramjee 2023). The ADPs worked in the areas of improving agricultural services and human development. The agricultural extension personnel are those who examine the problems of the farmers and rural people and bring back to them a suitable solution to such problem (Safdar, 2020). However, the State's ADPs are now dormant due to lack of funds, even though the structure in terms of building assets; few personnel, serviceable vehicles, equipment, are still available but mostly in poor shape in most states (Federal Ministry of Agriculture and Food Security (FMAFS) & United State Agency for International Development (USAID, 2023).

For a successful and effective extension personnel's job, there is need for extension personnel to be competent in their jobs and these call for a continuous in-service training that will assist them in effective agricultural programme implementation and through extension service delivery. The effectiveness of agricultural extension personnel largely depends on their competency levels, which encompass technical knowledge, communication skills and the ability to facilitate participatory learning among farmers. However, in Northwestern Nigeria, where agriculture is a major driver of livelihoods and economic activity, the performance of extension services has been reported to be suboptimal, leading to low adoption rates of improved farming practices among smallholder farmers (Al-Zahrani *et al.*, 2017).

Olorunfemi (2023) specifically highlighted limited access to training and workshops as a constraint hindering extension agents' competence in promoting climate-smart agricultural practices. Similar to the constraints identified by Nwaogu *et al.* (2017), Umar *et al.* (2019) pinpointed lack of training opportunities and inadequate supervision as factors hindering improvements in extension worker competency. A key failure in traditional extension model is the number of farmer per extension worker; they cannot visit all the smallholder farmers effectively and in a timely manner. The ratio in Nigeria is 1 extension worker: 3000 farmers. The ratio of extension worker to farmers is



grossly inadequate and highly disturbing considering the World Bank's standard of 1:500 (Ogbe, 2016). In the light of the foregoing, problems such as inadequate training, outdated knowledge, poor funding among others are factors limiting the effectiveness of extension personnel in Nigeria. Similarly, there is a lack of empirical data specifically assessing the competency level of extension personnel in Northwestern Nigeria. Without a clear understanding of their existing skills gaps, training interventions may remain misaligned with the actual requirements, further diminishing the impact of agricultural extension services. If competency gaps are not systematically assessed and addressed, the potential for agricultural productivity growth, food security, and rural development in Northwestern Nigeria will remain unrealized.

Agricultural extension personnel play a pivotal role in bridging the gap between research institutions and farmers, facilitating the dissemination of improved agricultural practices, technologies, and innovations. In Northwestern Nigeria, where agriculture is the backbone of rural livelihoods and food security, the effectiveness of extension service is critical to increasing productivity, reducing poverty, and achieving sustainable development goals. However, the performance of extension personnel is often hindered by inadequate competencies, and insufficient training. (Mahaliyanaarchchi & Bandara, 2006, cited in Tafida, *et al.*, 2021). Despite the importance of these personnel, there is limited empirical data assessing their actual competency levels and identifying specific areas where training is most needed. Previous studies have often treated extension challenges in general terms, without focused examination of the personnel's capacity in the unique socio-economic and agro-ecological context of Northwestern Nigeria. Hence, competency level of agricultural extension personnel has been of enduring research interest. There has been a number of research works on competency level and training needs of agricultural extension workers in some countries example: Yosef *et al.* (2023) carried out a research work on Factors Affecting Competence Level of Agricultural Extension Agents in Northwestern Ethiopia, Al-Zaharani *et al.* (2017) conducted research on Assessing the Competencies and Training Needs of Agricultural Extension Workers in Saudi Arabia.

While in Nigeria for instance, Uzoechi *et al.* (2020) conducted a research work on socio-economic characteristics influencing extension agents' competencies in Southeast, Nigeria, Tafida, *et al.* (2021) conducted a research work on assessment of training needs and competence level of extension workers in Kano State, Nigeria, Nwaogu (2018) carried out a research work on competencies of agricultural development Programme personnel in extension service delivery in Oyo and Ogun States, Nigeria. Others include Chikaire *et al.* (2018) and Akande *et al.* (2018) who conducted similar studies in Bauchi State and Southwest, Nigeria respectively.

However, there is little or no information as regards assessment of competency level of agricultural extension personnel in Northwestern Nigeria. This study is therefore necessary to fill this gap by providing a detailed and context-specific assessment of the skills, knowledge, and training needs of agricultural extension personnel in the region. Understanding these factors is essential for designing targeted capacity-building programmes, improving service delivery, and ensuring that farmers receive timely and relevant agricultural advice. Ultimately, the findings will contribute to strengthening the agricultural extension system, enhance productivity, and promote rural development in Northwestern Nigeria.

The broad objective of this study is to assess the competency level of the extension personnel in Northwestern Nigeria. The specific objectives of this study are to:

- ascertain the knowledge level of extension personnel on agricultural service delivery in Northwestern Nigeria.
- examine the level of competency of agricultural extension personnel in Northwestern Nigeria.
- Identify the competency gap (areas where there is need for development) of extension personnel in Northwestern Nigeria
- identify constraints militating against realization of high technical competency among extension personnel in Northwestern Nigeria.

METHODOLOGY

Description of the Study Area

North-West Nigeria comprises of seven states, namely, Sokoto, Kebbi, Zamfara, Katsina, Kaduna, Kano and Jigawa States. The Zone occupies a land mass of about 214,395 km and it lies between longitude 12° 10' North and latitude 6° 15' East (Eze *et al*, 2014). Based on the 2023 Cadre Harmonize Analysis for Nutrition Food and Nutrition Security in the Sahel, North-West Nigeria is the most populated geopolitical zone with 53,712,067 people.

The Zone experienced two climatic seasons; the wet season which lasts from April to October and the dry season which lasts from November till March (Eze *et al*, 2014). The dry season commences with harmattan, a dry chilly spell that lasts till February and is associated with lower temperatures. February to March is the hottest period of the year and temperature ranges from 33 to 41 °C (Eze *et al.*, 2014). As regards rainfall distribution, the drier North-West zone has the Sahel savanna vegetation. The zone has relative advantage in respect to the use of e-resources in extension service delivery by the extension personnel as there are many mobile networks available.

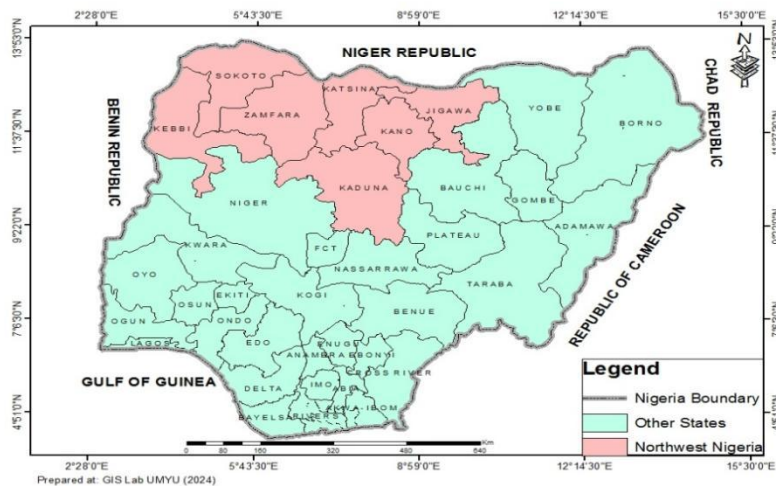


Figure 1: A map of Nigeria showing the Northwestern States

Sampling Procedure and Sample Size

A multi-stage sampling approach was employed for extension personnel selection. First, three States (Katsina, Kano, and Zamfara) were chosen randomly. The second stage involved simple random selection of extension personnel within 8 ADP zones across the three chosen states. Raosoft sample calculator was used at 5% margin of error and 95% confidence interval. The third stage involved proportionate sampling of 256 extension personnel in Kano State, 16 extension personnel in Katsina State and 34 extension personnel in Zamfara State and the last stage also involved proportionate sampling of extension personnel from eight (8) ADP zones across the 3 chosen States.

Table 1: Population and Sample Size of Extension Personnel in the Study Area

Sampled states	Population of extension personnel	Number of extension personnel selected (sample size)
Katsina	76	16
Kano	1253	256
Zamfara	169	34
Total	1498	306

Source: Reconnaissance Survey, KTARDA, KNARDA, and ZADP, March 2024



Data Collection

Data was collected through structured questionnaires. The questionnaire was pretested to check for its appropriateness and correctness in generating all the necessary information to meet the objective of the research. The information collected includes; socio-economic characteristics of the respondents, their competency level, competency gaps and constraints militating against the realization of high technical competency

Validity of Research Instrument

The Instrument for data collection was subjected to both face and content validity. Face validity was carried out with the assistance of experts in the field of agricultural extension and rural development. This was achieved by seeking the opinions of the experts on the representativeness and adequateness of items designed to measure the various variables of the study. This procedure had assisted in developing items that cover the objectives and capture the content that was assessed in the study.

Multi-stage approach was employed in establishing the validity of the research instrument (DeVellis, 2017). This process is crucial in quantitative research, as validity refers to the extent to which the instrument measures the intended concepts (Polit and Beck, 2017). First, experts reviewed the instrument items for content and face validity. Content validity ensures the items comprehensively capture the target constructs, while face validity assesses their clarity and appropriateness for the target population (Polit and Beck, 2017). Following expert review, a pretest was conducted to further refine the instrument and enhance its validity. Finally, the experts' approval assured the instrument's suitability for the research objectives.

Pretesting of the Research Instrument

The instrument was pretested at Jigawa State which is not among the selected States. It was administered to 10% of the intended target population (≈ 30).

Reliability of the Research Instrument

To ensure the data collection instrument possess the necessary level of reliability and adequately address the research objectives, a thorough analysis of their internal consistency was conducted using split-half method. This method assesses the consistency of scores obtained by dividing the instrument into two halves and calculating the correlation between them. A reliability coefficient of 0.87 was found which indicates a high level of internal consistency as suggested by Kuder and Richardson (1937) and Reale and Twycross (2015), meaning the instrument will yield consistent results across administration.

Measurement of Variables

Dependent Variables

Dependent variable in this study is the competency level which refers to the knowledge, skills, and abilities (KSAs) related to extension service delivery required in discharging responsibilities. This encompasses a strong understanding of the principles behind core competency and the ability to apply them effectively (FAO, 2016). Competency level in extension service delivery covers various techniques across different domains. Agric Extension personnel were asked to rate their self-perceived level of knowledge on 27 specific areas of extension using a Likert type scale with very low (1), low (2), medium (3), high (4), and very high (5). Data collected was analyzed and finally some perceived constraints were listed and the extension personnel indicated those that they felt as constraints and those that were not. Descriptive statistics (frequencies, percentages, mean and standard deviation) was used to summarize the data.

Data Analysis

Data collected for the study were analyzed using both descriptive and inferential statistics. The descriptive statistics were used to ascertain the knowledge level, identify the competency level, and identify the constraints militating against realization of high competency among extension personnel in Northwestern Nigeria. Principal Component Analysis (PCA) was used to identify the competency gap among respondents.

Model Specification

Principal Component Analysis (PCA)

The model specification for the PCA used include



$$Z = X . V$$

Where

Z = Principal component scores

X = Original data matrix

V = Eigenvector matrix (or loading matrix)

For data generated by Likert scale;

$$Z_{ij} = \frac{X_{ij} - \mu_j}{\sigma_j}$$

where;

X_{ij} is the observed value for the i -th individual on the j -th variable

μ_j is the mean of the j -th variable, and

σ_j is the standard deviation of the j -th variable.

The covariance matrix Σ was a P x P matrix

$$\Sigma = \frac{1}{n-1} X^T X$$

$$\text{The cumulative variance} = \frac{\sum_{i=1}^k \lambda_i}{\sum_{i=1}^p \lambda_i}$$

$$PCS = X . V$$

RESULTS AND DISCUSSION

Knowledge Level of Extension Personnel on Agricultural Service Delivery

The finding of this research work on the knowledge levels of extension personnel in six key areas: Extension Planning, Implementation, Monitoring & Evaluation (M&E), Communication, Subject matter, and ICT. The mean score and standard deviation indicate the extent to which extension personnel possess essential knowledge for effective service delivery.

In all, the results on knowledge level of extension personnel agricultural extension service delivery revealed that 90.8% of respondents fall within the high knowledge category implying that majority of extension personnel in Northwestern Nigeria are well-versed in key areas of agricultural extension service delivery.

However, there are specific gaps in M&E, communication, and ICT that need to be addressed through targeted training programs for better improvement of the extension service delivery system in the study area. And this is in line with the findings of Akande *et al.* (2018), who investigated the knowledge of extension agents regarding the professionalization of extension services in southwest Nigeria. Their study revealed significant disparities in the level of knowledge between public and private extension personnel (Table 2).



Table 2: Knowledge Level of Extension Personnel on Agricultural Service Delivery

Variables	Weighted score	Mean score	Std. Dev	Remark
Extension Planning				
Being familiar with extension system goal	1057	3.45	1.07	Medium
Knowing extension approaches	1068	4.49	0.98	Medium
knowing need assessment tools	1079	3.52	0.94	High
Being familiar with community resources	1067	3.48	1.00	Medium
familiar with work plan rudiments	1093	3.57	0.89	High
Implementation				
Knowing team work	1100	3.59	0.96	High
Knowledge of training facilitation	1134	3.71	0.95	High
Knowledge of extension ethics	1131	3.69	0.96	High
Knowledge of farmers' culture	1112	3.63	1.04	High
Knowledge of interest-based negotiation	1082	3.53	1.09	High
Monitoring and Evaluation				
Understanding the concept of M&E	992	3.24	0.95	Medium
Knowledge of data collection design	1024	3.36	0.98	Medium
Knowledge of data analysis method	1015	3.32	1.05	Medium
Knowledge of report writing	976	3.18	1.06	Medium
Communication				
Knowledge of local social values	1108	3.62	0.95	High
Knowledge of basic communication skills	1016	3.32	1.09	Medium
Knowledge of local jargons	1076	3.51	0.96	High
Knowledge of local calendar	1080	3.53	1.09	High
Subject Matter				
Knowledge of crop production	1200	3.92	0.90	High
Knowledge of animal production	1115	3.64	1.07	High
Knowledge of soil management	1101	3.59	1.08	High
Knowledge of value chain approaches	1057	3.45	1.15	Medium
Knowledge of agribusiness principles	1058	3.45	1.19	Medium
Knowledge of pest and diseases	1048	3.42	1.17	Medium
ICT				
Knowledge of ICT gadgets	931	3.04	1.23	Medium
Knowledge of ICT tools application	918	3.00	1.17	Medium
Knowledge of software	883	2.88	1.21	Medium
Knowledge Level of Agricultural Extension Personnel				
Knowledge level	Knowledge category	Freq	percent	
Low	0.00-1.50	-	-	
Medium	1.51-2.50	28	9.2	
High	2.51-5.00	278	90.8	

Source: Field survey, 2025 **1= very low, 2= low, 3= medium, 4=high, 5=very high**

Level of Competency of Agricultural Extension Personnel in Northwestern Nigeria

Findings of this research work on table 3, revealed that greater majority (99.3%) of the variables have mean scores above 3.5, indicating high competency level, and this is contrary to the findings of Yosef *et al.*, 2023 who found an average mean score of 2.77 which falls in the medium level category.

Table 3: Level of Competency of Agricultural Extension Personnel in Northwestern Nigeria

Variables	Weighted score	Mean score	Std. Dev	Remark
Extension Planning				
Knowledge on extension goal & philosophy	1013	3.57	0.94	High
Knowing extension approaches	1123	3.67	0.84	High
knowing need assessment tools	1103	3.60	0.88	High
Being familiar with community resources	1107	3.62	0.82	High
familiar with work plan rudiments	1121	3.66	0.83	High
Implementation				
Knowing team work	1106	3.61	1.07	High
Knowledge of training facilitation	1115	3.64	1.05	High
Knowledge of extension ethics	1117	3.65	1.03	High
Knowledge of farmers' culture	1121	3.66	0.96	High
Knowledge of interest-based negotiation	1110	3.62	0.88	High
Monitoring and Evaluation				
Understanding the concept of M&E	1667	3.49	0.91	Medium
Knowledge of data collection design	1063	3.47	0.83	Medium
Knowledge of data analysis method	970	3.16	0.92	Medium
Knowledge of report writing	1009	3.29	0.93	Medium
Communication				
Knowledge of local social values	998	3.26	0.92	Medium
Knowledge of basic communication skills	1017	3.32	0.99	Medium
Knowledge of local jargons	1048	3.42	0.88	Medium
Knowledge of local calendar	1040	3.39	0.82	Medium
Subject Matter				
Knowledge of crop production	1115	3.64	0.93	High
Knowledge of animal production	1120	3.66	1.05	High
Knowledge of soil management	1104	3.61	1.07	High
Knowledge of value chain approaches	1128	3.68	1.03	High
Knowledge of agribusiness principles	1171	3.82	0.94	High
Knowledge of pest and diseases	1204	3.93	0.79	High
ICT				
Knowledge of ICT gadgets	1144	3.73	0.99	High
Knowledge of ICT tools application	1203	3.93	1.10	High
Knowledge of software	1233	4.03	1.05	High

Competency Level of Agricultural Extension Personnel

Competency level	Competency category	Freq	Percent
Low	0.50-2.00	-	-
Medium	2.01-3.50	2	0.7
High	3.51-5.00	304	99.3

Source: field survey, 2025

Competency Gap of Extension Personnel in Northwestern Nigeria

Result presented on Table 4 revealed the competency gap (areas where there is need for development) of agricultural extension personnel in Northwest Nigeria using Principal Component Analysis (PCA). The analysis extracted six factors from the competency-related variables, explaining 77.801% of the total variance in extension personnel competencies. The Bartlett's test result ($\chi^2 = 8356.512$, $df = 351$, $p < 0.001$) confirms that the data is suitable for Principal Component Analysis (PCA). For this interpretation, strong competencies are those variables with high and positive loadings, above 0.5 while weak competencies are those variables with low or negative loadings below 0.5.

The competency gap based on the factors include; Extension planning (Factor1): Being familiar with community resources (0.448). This implies a gap in sustainable utilization of limited resource available locally. Monitoring & Evaluation (Factor 2): Understanding the concept of M&E (0.425) and knowledge of report writing (0.322). This suggests a gap in systematic tracking and assessment of extension activities, which could hinder evidence-based decision-making.



Communication (Factor 4): Knowledge of basic communication skills (0.306). Poor communication skills may affect the ability to engage effectively with farmers, reducing the impact of extension programmes. While Subject Matter (Factor 5): Knowledge of crop production (-0.401) and knowledge of agribusiness principles (-0.312) were observed. This may limit extension personnel's ability to provide adequate technical support to farmers.

However, ICT (Factor 6): Knowledge of software (0.426) and knowledge of ICT gadgets (0.494). Limited ICT competencies suggest difficulties in adopting modern agricultural technologies and digital extension services. This agrees with the findings of Nwaogu *et al.* (2017) who identified competency gaps in ICT, and programme evaluation.

Table 4: Competency Gap of Extension Personnel in Northwestern Nigeria.

Variables	Fac1	Fac2	Fac3	Fac4	Fac5	Fac6
Extension Planning						
Knowledge on extension goal philosophy	0.758					
Knowing extension approaches	0.820					
knowing need assessment tools	0.517					
Being familiar with community resources	0.488					
familiar with work plan rudiments	0.570					
Implementation						
Knowing team work		0.818				
Knowledge of training facilitation		0.829				
Knowledge of extension ethics		0.810				
Knowledge of farmers' culture		0.856				
Knowledge of interest-based negotiation		0.774				
Monitoring and Evaluation						
Understanding the concept of M&E			0.425			
Knowledge of data collection design			0.819			
Knowledge of data analysis method			0.859			
Knowledge of report writing			0.322			
Communication						
Knowledge of local social values				0.667		
Knowledge of basic communication skills				0.306		
Knowledge of local jargons				0.745		
Knowledge of local calendar				0.577		
Subject Matter						
Knowledge of crop production					-0.401	
Knowledge of animal production					0.582	
Knowledge of soil management					0.887	
Knowledge of value chain approaches					0.869	
Knowledge of agribusiness principles					-0.312	
Knowledge of pest and diseases					0.706	
ICT						
Knowledge of ICT gadgets						0.494
Knowledge of ICT tools application						0.521
Knowledge of software						0.426
Eigenvalue	11.520	3.612	2.042	1.630	1.181	1.021
Percent of variance	42.668	13.377	7.563	6.038	4.374	3.781
Cumulative percent	42.668	56.045	63.608	69.647	74.020	77.801
Bartlett's Chi ² = 8356.512						
Degree of freedom = 351, Sig = 0.000						

Source: Field Survey, 2025

Note: Fac = Factor

Constraints Affecting Extension Personnel in Northwestern Nigeria

The results on constraints faced by extension personnel in discharging their duty highlight the major constraints to include: many jobs with different specializations expected (97.1%). The expectation for personnel to handle diverse tasks reduces efficiency and weakens technical



specialization, lack of training and re-training (88.9%), without continuous skill improvement, personnel cannot keep up with new technologies, digital tools, and modern farming techniques,

Unavailability of resources (75.2%) and lack of funding (74.8%). Resource shortages (e.g. transport, demonstration materials, ICT tools) limit effectiveness, Disproportionate extension-farmer ratio (73.9%), fewer personnel managing too many farmers lead to inefficient service delivery and farmer dissatisfaction, poor remuneration (72.5%) and poor attitude (62.1%), weak internet connectivity (70.6%) affects access to digital extension tools, online training, and farmer advisory services. This finding aligns with the broader limitations identified by Nwaogu *et al.* (2017) and Olorunfemi (2023), who specifically highlighted limited access to training and workshops as a constraint hindering extension agents' competence in promoting climate-smart agricultural practices. Similarly, Umar *et al.* (2019) pinpointed lack of training opportunities and inadequate supervision as factors hindering improvements in extension worker competency. (Table 5)

Table 5: Constraints Militating against Realization of High Technical Competency among Extension Personnel in Northwestern Nigeria.

Constraints	*Freq	percent	Rank
Lack regular training and re-training of extension personnel	272	88.9	2 nd
Disproportionate extension-farmer ratio	226	73.9	5 th
Un availability of resources	230	75.2	3 rd
Lack of funding for extension activities	229	74.8	4 th
Poor remuneration	222	72.5	6 th
Weak internet connectivity	216	70.6	7 th
Poor attitude of extension personnel towards the service	190	62.1	8 th
Too many jobs with different specializations expected	297	97.1	1 st

Source: Field Survey, 2025

*Multiple responses

CONCLUSION AND RECOMMENDATIONS

From the findings of this study, it could be concluded that extension personnel possess medium to high knowledge in various areas of agricultural service delivery, but significant gaps in ICT knowledge and basic communication skills remain, several areas such as extension planning, monitoring & evaluation, and subject matter expertise, particularly in agribusiness and ICT, require improvement. Key constraints include inadequate training, resource shortages, high extension-farmer ratios, poor remuneration, and ineffective management. Addressing these challenges would significantly improve the effectiveness of agricultural extension services in the region.

Based on the findings of this study, it is recommended:

1. There should be a continuous professional development, particularly in ICT skills, basic communication, and modern extension techniques for extension personnel.
2. Funding and other resources are to be made available for necessary tools and equipment, such as ICT gadgets, transportation, and demonstration materials.
3. Additional extension personnel should be employed to help reduce the current disproportionate extension-farmer ratio, enhancing service delivery and reducing workload challenges.
4. Working conditions need be to improve.
5. Bureaucratic processes and political interference by government need to be reduced.

REFERENCES

- Akande, A. A., Oladele, O. I., & Fabiyi, O. S. (2018). Knowledge of extension agents regarding professionalization of extension services: Evidence from South West Nigeria. *Journal of Agricultural Extension and Rural Development*, 10(2): 1–8.
- Al-Zahrani, K., Aldosari, F., Baig, M. B., Shalaby, M. Y., & Straquadine, G. S. (2017). Assessing the competencies and training needs of agricultural extension workers in Saudi Arabia. *Journal of International Agricultural and Extension Education*, 24(1): 34–48.



- Chikaire, J. U., Emerhirhi, E., Anyoha, N. P., & Onoh, P. A. (2018). Assessment of training needs of extension workers in Bauchi State Agricultural Development Programme, Nigeria. *Journal of Agricultural Science and Technology*, 8(1): 713–722.
- DeVellis, R. F. (2017). *Scale development: Theory and applications* (4th ed.). Sage Publications.
- Eze, T. C., Okpala, C. S., & Ogbodo, J. C. (2014). Patterns of inequality in human development across Nigeria's six geopolitical zones. *International Institute for Science, Technology and Education*, 4(8): 89-94.
- Federal Ministry of Agriculture and Food Security (FMAFS) & United States Agency for International Development (USAID). (2023). Agricultural Development Programme (ADP) assessment report.
- KTARDA, KNARDA, & ZADP. (2024). *Data collected from Planning, Research and Statistics/Monitoring and Evaluation units*.
- Kuder, G.F. and Richardson, M.W. (1937). The theory of estimation of test reliability. *Psychometrika*, 2, 151-160. <http://dx.doi.org/10.1007/bf02288391>
- Mahaliyanaarachchi, R.P. and Bandara, R. (2006). Commercialization of agriculture and role of agricultural extension. *Sabaragamuwa University Journal*, 6(1): 13-22.
- Murari, K., & Ramjee, G. (2023). Competency-based training for agricultural extension workers. *Proceedings of the 5th International Conference on Agricultural Extension* (pp. 112-125).
- Nwaogu, C. E., Ihedioha, C. I., & Ogwuebu, P. M. (2017). Competency needs of extension agents for effective job performance in the South Eastern Nigeria. *Nerd System*. <https://scholarworks.gvsu.edu/cgi/viewcontent.cgi?article=1760&context=theses>
- Nwaogu, F. K., & Akinbile, L. A. (2018). Competencies of Agricultural Development Programme personnel in extension service delivery in Oyo and Ogun States Nigeria. *Journal of Agricultural Extension*, 22(3): 40–52.
- Ogbe, A. O. (2016). Farmer-extension personnel ratio and agricultural productivity in Nigeria [Doctoral dissertation]. Ahmadu Bello University.
- Olorunfemi, O. D. (2023). Factors influencing extension agents' competence on climate smart practices in South West Nigeria: Implication for Rendering Effective Resilient Advisory Services. Retrieved from <https://www.sciencedirect.com/science/article/pii/S1658077X19300256>
- Polit, D. F., & Beck, C. T. (2017). *Nursing research: Generating and assessing evidence for nursing practice* (10th ed.). Lippincott Williams & Wilkins.
- Reale, S. and Twycross, A. (2015). *Using and interpreting statistics in psychology* 2nd (ed.). Routledge.
- Safdar, M. (2020). *The role of extension personnel in agricultural development*. Lambert Academic Publishing.
- Tafida, I., Yusuf, A. K., Kabir, A. M., & Abdullahi, A. (2021). Assessment of training needs and competence level of extension workers in Kano State, Nigeria. *FUDMA Journal of Science*, 5(1): 424–435.
- Umar, B. L., Salisu, M. A., & Ibrahim, A. A. (2019). Assessment of training needs and competence level of extension workers in Kano State, Nigeria. *FUDMA Journal of Sciences*, 5(1): 23-35. <https://fjs.fudutsinma.edu.ng/index.php/fjs/article/view/587>
- United State Agency for International Development (2023). Private sector-led extension delivery model. *Feed the future Nigeria agricultural extension and advisory services*, 40-45.
- Uzoechi, R. O., Ogunlade, I., & Afolabi, J. S. (2020). Socio-economic characteristics influencing extension agents' competencies in South-East, Nigeria. *FUOYE Journal of Agriculture and Agricultural Technology*, 6(1): 147–157.
- Yosef, T., Emam, A., & Elias, K. (2023). Factors affecting competence level of agricultural extension agents in Northwestern Ethiopia. *Agriculture & Food Security*, 12(1): 1-15.