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Analysis of the Digital Skill Gap of Agricultural Extension Personnel in South-East, Nigeria

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Abstract

The study analysed the digital skill gap of agricultural extension personnel on the use of digital technologies for extension services delivery in South-East, Nigeria. The specific objectives were to describe the socioeconomic characteristics of agricultural extension personnel in South-East Nigeria and identify the digital skill gaps among agricultural extension personnel in the area of study. Purposive sampling technique was used to select 364 Agricultural Extension personnel for the study. Data were collected through the use of structured questionnaire and were analysed using simple descriptive statistical tools such as percentages, mean score, and standard deviation. Findings indicated that most of the personnel were male (57.8%), within the age bracket of 38 - 47 years (62.9%), had B.Sc./HND as their highest educational qualification (74.7%), married (86.3%), and had a household size of 6 - 10 Persons (57.7%). It was further revealed that the majority (70.1%) were members of professional organization, earned a monthly income of N50,001.00 - N100,000.00 (65.7%), had a work experience of 11 - 15 years (51.1%), and owned a smartphone/iPad/laptop (91.5%). Findings further indicated that they had moderate skill gap in Basic Computer skills (Mean = 4.32), and digital communication and collaboration skills (Mean = 4.26). Findings also showed that they had a high skill gap in digital technical skills (Mean = 2.46), digital data analysis skills (Mean = 2.09), digital content creation skills (Mean = 2.43), digital ethical skills (Mean = 2.79), multimedia production skills (Mean = 2.81), and video library management skills (Mean = 2.39). The study concluded that though there exists a high digital skill gap among agricultural extension personnel in South-East, Nigeria, their socioeconomic characteristics are capable of supporting the implementation of digital extension services in the area. The study recommended that the management of Agricultural Development Programs in South-East, Nigeria, should provide digital training for extension personnel to close the digital skill gap that currently exists among the personnel.

Keywords

Agricultural Extension Personnel, Socioeconomic Characteristics, Digital Skill Gap, South-East, Nigeria

1. Introduction

The agricultural sector is the backbone of most economies in developing countries. It provides food and raw materials for industries. ElDidi [1] noted that agriculture provides food for developed and under-developed countries, raw materials for industries, creates employment, improves rural welfare, provides foreign exchange and contributes to capital formation. Agriculture was the primary economic activity in Nigeria at independence, contributing about 85 percent to foreign exchange, 90 percent to employment creation and 80 percent to the country's gross domestic product [2]. However, the country remains a net importer of food, a situation exacerbated by the reliance on small-scale farming practices, limited technological advancement, and inadequate access to markets and financing.

The significance of agricultural extension services cannot be overstated as they are pivotal in conveying valuable information and expertise to farmers [3], facilitating enhancements in their productivity and overall well-being [4]. Given the increasing need for integration of digital technologies in agriculture, it has become imperative to equip extension personnel with the necessary skills to effectively utilize these [5]. However, [6] noted that the success of extension services primarily hinges on the readiness and professional skills of extension workers. As outlined by Francis [7], extension workers are anticipated to consistently enhance their abilities and stay updated with advancements in technology, particularly in the realms of agricultural production methods and the methodologies employed in delivering extension services.

Since the past decade, there has been a focus on addressing the capacity-building needs of agricultural extension personnel to support farmers in effectively managing the challenges associated with climate change [8] [9]. However, the emergence of digital technologies has presented a need for an entirely new skill set among extension workers. These include the need for skills related to the utilization of new communication technology, the interpretation of research findings within digital environment, and the ability to collaborate and communicate with various stakeholders, leveraging digital platforms [10] [11].

However, to the best of our knowledge, there is scarcity of literature on the status of digital skills of agricultural extension personnel in South-East, Nigeria [12]. There is no empirical data on the above subject matter in South-East, Nigeria. This is a significant concern because designing appropriate training programs would be impossible without reliable and sufficient data on this critical area. As a result, agricultural extension personnel in South-East, Nigeria may not be able to effectively use digital technologies in their work or support farmers in adopting and

using digital technologies, leading to missed opportunities for increased efficiency and productivity for both extension personnel and farmers.

It is against this backdrop that this study was designed to explore the digital skill gaps of agricultural extension personnel in South-East, Nigeria. The specific objectives of the study were to:

- Describe the socio-economic characteristics of agricultural extension personnel in South-East, Nigeria, and;
- Determine the digital skill gaps of agricultural extension personnel in the area of study.

This study will enhance the current body of knowledge by highlighting the socioeconomic factors that influence the digital skill gaps of agricultural extension personnel in South-East, Nigeria. The outcomes of this investigation will provide valuable insights for policymakers, extension workers, and various agricultural sector stakeholders, enabling them to develop tailored training programs that cater to the unique demands of extension personnel in South-East, Nigeria.

2. Methodology

The study was carried out in South-East, Nigeria. The zone comprises five states: Abia, Anambra, Ebonyi, Enugu and Imo States. It lies primarily in the country's tropical rainforest agro-ecological zone. The region is located within longitudes 5˚30' and 9˚30'E and latitudes 4˚30' and 7˚00'N occupies a land area of 75,488 km^2 [13]. The region has a population of 16,381,726 million people and is characterized by two distinct climatic seasons: the rainy season (April to November) and the dry season (December to March) [13]. The mean annual rainfall of the region varies from 1500 mm in the northern border of Enugu and Ebonyi States to over 2000 mm in the southern fringes of Anambra, Imo and Abia States [13]. Farming is the significant economic activity of the people of the region. The dominant food crops cultivated include cassava, yam, maize, vegetables and agroforestry such as oil palm, mangoes, oranges, and pear. Livestock such as poultry, goats, sheep, and pigs are the major livestock reared in the area [14].

The provision of agricultural extension services in Nigeria, including the South-East region, is predominantly carried out by the Agricultural Development Program (ADP), which operates as a subsidiary agency under the state Ministries of Agriculture (MoA). In the South-East states of Nigeria, each state has its own ADP, and these ADPs are administratively structured into headquarters, zones, blocks, and circles.

The population for the study comprised all agricultural extension staff and the Subject Matter Specialists (SMSs) under the ADP system in South-East, Nigeria. A purposive sampling technique was used to select three of the five states in the study area. The three states selected were Anambra, Ebonyi and Imo States. They were selected based on certain considerations such as accessibility, functional ADP, and being contiguous to other states that were not selected. For instance, Anambra and Enugu States were contiguous to each other, while Imo and Abia

States were also contiguous to each other. All the extension personnel, comprising the Directors of extension, Zonal Extension Officers (ZEOs), Block Extension Supervisors (BESs), Block Extension Agents (BEAs), Village Extension Agents (VEAs), and Subject Matter Specialists (SMSs) were used for the study. From the list obtained from the Various ADP Headquarters of the three selected states, there were 345 extension staff and 42 Subject Matter Specialists, totaling 387 extension personnel sampled for the study. Data collection was carried out through the use of well-structured and validated questionnaire. The questionnaire was administered through the help of well-trained enumerators under the strict supervision of the researchers. Out of a total of 387 respondents sampled in the study, only 364 copies of the instrument were properly completed and returned for analysis.

Data for this study were analyzed using SPSS software version 26.0. Specifically, data from the socioeconomic characteristics were analyzed using percentages, mean scores and standard deviation. The digital skill gaps were determined through a self-assessment score by the respondents. To achieve that, a digital skill table was generated from literature and presented to the respondents to assess themselves based on the listed digital skills, using a scale of 9 (1 for low and 9 for high), and their scores were grouped as 1 - 3 = High digital skill gap, 4 - 6 = Moderate digital skill gap, and 7 - 9 = Low digital skill gap.

3. Results and Discussions

3.1. Socio-Economic Characteristics of Agricultural Extension Personnel

The socio-economic characteristics of agricultural extension personnel are important variables in this study. These variables were investigated to comprehend their pre-disposing influence on the use of digital technologies. The socio-economic variables considered in the study were sex, age, educational qualification, marital status, household size, professional organisation membership, average monthly income, work experience, and ownership of a smartphone/laptop/iPad. The distribution of the respondents according to their socio-economic characteristics is presented in Table 1 below.

Table 1. Distribution of the respondents according to their socio-economic characteristics.

Socio-Economic Characteristics	Anambra State		Ebonyi State		Imo State		Pooled (South-East)	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Sex								
Male	25	48.1	73	55.3	104	57.8	202	55.5
Female	27	51.9	59	44.7	76	42.2	162	44.5
Total	**52**	**100**	**132**	**100**	**180**	**100**	**364**	**100**
Age								
28 - 37	9	17.3	13	9.8	15	8.3	37	10.2
38 - 47	24	46.2	96	72.7	109	60.6	229	62.9

Continued

48 - 57	17	32.7	17	12.9	42	23.3	76	20.9
58 and above	2	3.8	6	4.5	14	7.8	22	6.0
Total	**52**	**100**	**132**	**100**	**180**	**100**	**364**	**100**
Mean	45.35 ± 7.64		44.73 ± 6.08		49.2 ± 7.58		46 ± 7.35	
Educational qualification								
OND/NCE	21	40.4	23	17.4	23	12.8	67	18.4
B.Sc./HND	21	40.4	102	77.3	149	82.8	272	74.7
M.Sc./MBA/M.A	9	17.3	7	5.3	8	4.4	24	6.6
PhD	1	1.9	-	-	-	-	1	0.3
Total	**52**	**100**	**132**	**100**	**180**	**100**	**364**	**100**
Marital status								
Single	10	19.2	7	5.3	14	7.8	31	8.5
Married	37	71.2	120	90.9	157	87.2	314	86.3
Divorced	2	3.8	-	-	5	2.8	7	1.9
Widow/Widower	3	5.8	5	3.8	4	2.2	12	3.3
Total	**52**	**100**	**132**	**100**	**180**	**100**	**364**	**100**
Household size								
1 - 5	22	42.3	51	38.6	73	40.6	146	40.1
6 - 10	30	57.7	74	56.1	106	58.9	210	57.7
11 - 15	-	-	7	5.3	1	0.6	8	2.2
Total	**52**	**100**	**132**	**100**	**180**	**100**	**364**	**100**
Mean	5.98 ± 2.14		6.2 ± 2.70		5.98 ± 1.66		6.0 ± 2.19	
Membership of professional organization								
Yes	38	73.1	82	62.1	135	75.0	255	70.1
No	14	26.9	50	37.9	45	25.0	109	29.9
Total	**52**	**100**	**132**	**100**	**180**	**100**	**364**	**100**
Monthly Income (Naira)								
1 - 50,000	16	30.8	51	38.6	41	22.8	108	29.7
50,001 - 100,000	35	67.3	70	53.0	134	74.4	239	65.7
100,001 - 150,000	1	1.9	8	6.1	5	2.8	14	3.8
150,001 - 200,000	-	-	3	2.3	-	-	3	0.8
Total	**52**	**100**	**132**	**100**	**180**	**100**	**364**	**100**
Mean	62,711.09 ± 8.99		58,798.3 ± 6.79		62,648.75 ± 8.49		61,386.00 ± 8.09	
Years of working experience								
1 - 5	3	5.8	-	-	23	12.8	26	7.1
6 - 10	8	15.4	30	22.7	17	9.4	55	15.1
11 - 15	29	55.8	76	57.6	81	45.0	186	51.1

Continued

16 - 20	8	15.4	13	9.8	41	22.8	62	17.0
21 - 25	4	7.7	13	9.8	18	10.0	35	9.6
Total	**52**	**100.0**	**132**	**100.0**	**180**	**100.0**	**364**	**100.0**
Mean	13.6 ± 9.38		12.4 ± 6.37		13.4 ± 8.58		13.1± 8.16	
Ownership of smartphone/laptop/iPad								
No	6	11.5	16	12.1	9	5.0	31	8.5
Yes	46	88.5	116	87.9	171	95.0	333	91.5
Total	**52**	**100**	**132**	**100**	**180**	**100**	**364**	**100**

Source: Field survey data, 2023, ± = Standard deviation.

The result in Table 1 shows that the majority (55.5%) of agricultural extension personnel in South-East, Nigeria were male; suggesting that males are more involved in agricultural extension services than females. State-wise analysis shows that there were more females (51.9%) than males (48.1%) agricultural extension personnel in Anambra State, whereas there were more males (55.3%) and (57.8%) agricultural extension personnel in Ebonyi and Imo States, respectively. This result is consistent with the findings of [11] [14] [15], who reported that more males than females are involved in agricultural extension services. This implies that there are more male extension personnel than females in South-East, Nigeria. However, It should be noted that the gap between the number of male extension personnel and females is not wide, indicating that females are rapidly catching up with males in taking extension roles. This is a good development, considering the importance of gender inclusivity in extension services.

The result also shows that the majority (62.9%) of agricultural extension personnel in South-East, Nigeria were within the age bracket of 38 - 47 years, while the least (6.0%) were within the age bracket of 58 years and above. The mean age of the agricultural extension personnel in South-East, Nigeria was 46 years. This implies that most agricultural extension personnel were still young and in their active service years. This result agrees with the findings of Lawal-Adebowale [16], who reported that most extension workers are still in their active ages. The state-wise analysis reveals that the majority of agricultural extension personnel in Anambra State (46.2%), Ebonyi State (72.7%), and Imo State (60.6%) were within the age bracket of 38 - 47 years. The mean ages of the agricultural extension personnel in Anambra State, Ebonyi State, and Imo State were 45.4 years, 44.7 years, and 49.2 years, respectively. This implies that most agricultural extension personnel in the various states were young people in their active years in service. This is good because young people are more prone to innovation and change. They can easily adopt digital technologies if given the necessary training and supporting environment. Younger agricultural extension personnel are more likely to cope with the initial changes in integrating digital technologies in extension delivery. These findings are also supported by the results of Iheke [17], who observed that

young people have more risk-taking attributes, innovative abilities and mental capacity to cope with changes in the work environment.

Also, data in Table 1 reveals that about three-quarters (74.7%) of agricultural extension personnel in South-East, Nigeria possessed a Bachelor's degree (B.Sc.) or a Higher National Diploma (HND) as their highest level of education. This distribution is consistent across the studied states of Anambra, Ebonyi, and Imo, with majority (40.4%, 77.3% and 82.8%), respectively, possessing B.Sc. or HND qualifications. A noteworthy observation is that all the extension personnel in the region had good formal educational training. Their educational level is crucial as it equips them with solid comprehension and communication skills, which are pivotal for effective information dissemination to farmers and the ability to understand and appreciate the importance of digital technologies in their work. Also, a sound educational background exposes individuals to continuous learning techniques for career improvement, enabling them to employ new methodologies in engaging with farmers for enhanced productivity.

The practical implication of their educational profile is that the agricultural extension personnel are well-prepared to embrace novel digital methodologies in extension delivery. These innovations can revolutionize extension services by providing prompt and improved farmer assistance, thereby contributing to enhanced farm productivity. This result is in line with the conclusions drawn by [18] [19]. These researchers concur that education serves as an invaluable instrument for acquiring new knowledge, its practical application to problem-solving, fostering the adoption of contemporary adaptive strategies, and effectively navigating the intricacies of new technologies within extension services.

Furthermore, the data in Table 1 indicate that a significant proportion (86.3%) of agricultural extension personnel in South-East, Nigeria is married. This pattern is consistent across the individual states studied, with 71.2 percent in Anambra, 90.9 percent in Ebonyi, and 87.2 percent in Imo State. This implies that almost all the extension personnel in the area are married. There are a number of socio-economic benefits of being married. Examples are joint financial decisions, shared assets, and ability to pool resources which are capable of leading to greater wealth accumulation. Also, marriage can provide social and emotional support which can enhance psychological well-being, job satisfaction and overall productivity, and by implication would help the extension personnel to cope with the initial changes in the work delivery methodologies due to the introduction of digital technologies.

The result further reveals that most agricultural extension personnel (57.7%) in South-East, Nigeria had a household size of between 6 and 10 persons, while the least proportion (2.2%) had more than 10 persons. The mean household size of agricultural extension personnel was 6 persons per household. This reveals that the agricultural extension personnel in the study area had relatively large household sizes, slightly higher than the national average of five (5) persons per household (20). Large household sizes would convey a huge responsibility to the household heads to cater. The household size of individuals influences their

commitment level to work and participation in training that will help them boost their productivity, earn promotions, and earn higher salaries and wages that will enable them to cater to their large households' needs. The study aligns with [20] [21], who reported that people appear to be more committed to whatever they do when they have a large household size that depends on them for food, shelter, and clothing.

The result in **Table 1** further shows that the majority (70.1%) of agricultural extension personnel in South-East, Nigeria belonged to professional organisations. The same was the case in each of the studied states of Anambra, Ebonyi, and Imo, where 73.1%, 62.1%, and 75.0% of the agricultural extension personnel were members of professional organisations. This implies that most agricultural extension personnel have a forum for interacting with others, exchanging ideas and learning together. Their involvement in group activities allows them to gain insights into the happenings around them. The findings are in alignment with those of [22] [23], who posited that membership in cooperative societies allows members to share information on modern production techniques, purchase inputs in bulk, and exchange labour. This result also aligns with the study of Manteaw [24]. It has been established that individuals who participate in social organisations such as cooperative societies, community development associations, and other self-help groups adopt innovations more than those who do not belong.

Also, the results in **Table 1** shed light on a disquieting pattern relating to the earnings of agricultural extension personnel in South-East, Nigeria. It was revealed that the majority (65.7%) of the personnel were earning between N50,001.00 and N100,000.00 monthly, while the smallest proportion (0.8%) were earning between N150,001.00 and N200,000.00 monthly. This pattern was consistent across the studied states of Anambra, Ebonyi, and Imo, with 67.3 percent, 53.0 percent and 74.4 percent of personnel falling within the N50,001.00 to N100,000.00 income bracket, respectively.

The mean monthly income for agricultural extension personnel in South-East, Nigeria was N61,386.00, while the respective mean incomes per month for extension personnel in Anambra, Ebonyi, and Imo States were N62,711.09, N58,798.30, and N62,648.75 respectively. These figures collectively reveal a prevalent low-income situation among agricultural extension personnel in South-East, Nigeria. This result is in line with the observation of Asiabaka [25] and the findings of Undiandeye [26] and Ajani [27], who noted that agricultural extension workers are poorly remunerated.

This financial predicament may have adverse consequences on the motivation and willingness to embrace innovations that could enhance organizational performance or their ability to invest in acquiring digital technology devices and skills without external support. It is worth noting that improved incentives have been identified as effective motivators for individuals, as observed in the study by Aguinis [28], which suggested that providing better incentives can lead to increased performance and overall organizational success.

The result in Table 1 also shows that the majority (51.1%) of the agricultural extension personnel in South-East, Nigeria had working experience ranging between 11 and 15 years, with an average working experience of 13.1 years. The same was the case in each of the studied states of Anambra, Ebonyi, and Imo States, where 55.8 percent, 57.6 percent, and 45.0 percent of the agricultural extension personnel had a working experience that ranged between 11 and 15 years, with average working experiences of 13.6 years, 12.4 years, and 13.4 years, respectively. This indicates that, on average, agricultural extension personnel in the study area had spent more than a decade on the job. This reveals that the various state ADPs in South-East, Nigeria have not been recruiting a good number of extension workers in recent years. Fidelugwuowo [29] observed a wide gap in the extension-farmer ratio in South-East Nigeria. This result further underscores the importance of integrating digital technologies in extension delivery as they will help enhance coverage, effectiveness, and efficiency in service delivery.

On the other hand, years of experience are also important in organizational performance. The longer agricultural extension personnel have been in service, the more practical expertise they will have in dealing with the challenges that come with extension services. Working expertise is also valuable for developing ideas and implementing improved working practices to increase efficiency and output. This finding aligns with that of Kang [30], who stated that increased working experience leads to improved performance efficiency by assisting individuals in adopting better working methodologies.

The result in Table 1 also shows that the majority (91.5%) of the agricultural extension personnel in South-East, Nigeria own a smartphone, laptop or ipad. The same was the case in each of the studied states of Anambra, Ebonyi, and Imo, where 88.5 percent, 87.9 percent, and 95.0 percent of the agricultural extension personnel own a smartphone, respectively. This indicates that smartphones were important and commonly used digital gadgets among agricultural extension personnel in the study area. The reason for this result may be that smartphones are handy and can be used to perform many functions [31]. This can help them carry out their work more effectively if they understand more about its uses and relevance for extension services delivery outside of making and receiving calls.

3.2. Digital Skill Gaps among Agricultural Extension Personnel in South-East, Nigeria

The mean score of the self-rating of digital skills of agricultural extension personnel in the South-East region of Nigeria is presented in Table 2.

Table 2 shows that the agricultural extension personnel in South-East, Nigeria had a grand mean score of 2.95 in their self-rating of their possession of key digital skills required for extension services delivery. This mean score of 2.95 falls within the mean range of 1.0 – 3.0, indicating a high gap in key digital skills among the extension personnel in South-East, Nigeria. Specifically, they reported a moderate skill gap in basic computer skills ($\bar{x}$ = 4.32) and digital communication and collaboration skills ($\bar{x}$ = 4.26). However, the results in Table 2 also indicate that

there was a high digital skill gap in most of the core digital skills assessed, such as digital technical skills ($\bar{x}$ = 2.46), digital data analysis skills ($\bar{x}$ = 2.09), content creation skills ($\bar{x}$ = 2.43) and digital ethics and cultural considerations skills ($\bar{x}$ = 2.79). Other areas in which they reported a high skills gap were multimedia production skills ($\bar{x}$ = 2.81) and Video library management skills ($\bar{x}$ = 2.39). This implies that there were high gaps in the level of knowledge or possession of digital technical skills (such as how to use mobile apps, e-learning platforms, geospatial devices and being able to configure, install and troubleshoot these technologies), digital data analysis skills (which include the ability to analyse and interpret data collected using digital devices such as sensors, drones, and remote sensing devices).

Table 2. Distribution of agricultural extension personnel according to their self-rating of their digital skills.

S/No	The Gap in Key Digital Skills Required in Extension Service Delivery	Anambra State (n = 52)		Ebonyi State (n = 132)		Imo State (n = 180)		Pooled (n = 364)	
		$\bar{X}$	RM	$\bar{X}$	RM	$\bar{X}$.	RM	$\bar{X}$	RM
i)	Basic computer skills (how to use computers, smartphones, digital cameras and software applications).	4.54	M	4.38	M	4.03	M	4.32	M
ii)	Digital technical skills (how to use mobile apps, e-learning platforms, geospatial devices, being able to install, configure and troubleshoot these technologies).	2.18	H	2.98	H	2.23	H	2.46	H
iii)	Digital communication and collaboration skills (Being able to interact through various digital technologies and knowing which technology to use for any given context, e.g. email, social media, video conferencing, etc.; understanding attributions and referencing practices within a digital environment.	4.33	M	4.16	M	4.29	M	4.26	M
iv)	Digital data analysis skills (being able to analyze and interpret data collected using digital devices such as sensors, drones, and remote sensing.	1.98	H	2.05	H	2.25	H	2.09	H
v)	Content creation skills (creating and publishing content in digital formats such as video tutorials, blog posts, etc.	2.03	H	2.35	H	2.92	H	2.43	H
vi)	Ethical skills (Being aware of ethical considerations related to the use of digital technologies such as data privacy, security both personal and device, intellectual property rights, etc.	2.88	H	2.91	H	2.58	H	2.79	H
vii)	Multimedia production skills (being able to produce multimedia content such as photos, videos, and podcasts and how to use them to communicate with farmers and other stakeholders.	2.98	H	2.78	H	2.68	H	2.81	H
xv)	Video library management skills (organizing and maintaining a collection of videos, cataloguing videos, and tracking them in a digital environment.	2.18	H	2.05	H	2.95	H	2.39	H
	Grand Mean score	**2.89**	**H**	**2.96**	**H**	**2.99**	**H**	**2.95**	**H**

*Acceptance means for digital skill gap of extension personnel (1.0 - 3.0 = High skill gap, 4.0 - 6.0 = Moderate skill gap, 7.0 - 9.0 = Low skill gap). $\bar{X}$ = Mean responses; RM = Remark; H= high, M = moderate, L = low; n = Total number of observations. Source: Field Survey, 2023.

Other areas where there exists high skills gap were content creation skills (such

as the ability to create and publish content in digital formats), ethical skills (including being aware of ethical considerations related to the use of digital technologies such as data privacy, personal and device security, and intellectual property rights), multimedia production skills (such as being able to create good photos, videos, podcasts, and other multimedia contents), and video library management skills (involving the ability to organize and maintain a collection of videos and being able to track them in a digital environment.

The state-by-state analysis is also consistent with the pooled result, as shown in Table 2. This explains that high digital skill gaps exist among agricultural extension personnel in South-East, Nigeria. This is in line with the submissions of Gould [32] and Bansal [33] who noted that training needs analysis aims to close the gap between the actual and desired situations by considering differences in outcomes, arranging them in order of priority, and selecting the most important for closure or reduction. This must be conducted before actual training can be performed, as it promotes synergy among individual learning needs and the quest for effectiveness in job performance and strategic organizational development.

4. Conclusions

This study delved into the socio-economic landscape of agricultural extension personnel in South-East Nigeria and their training needs in the realm of digital technologies. The findings offered valuable insights into the composition of this workforce and its readiness to embrace the digital age in agricultural extension services.

Firstly, it was observed that there was a balanced gender distribution among extension personnel, with a slight preponderance of males. This trend suggests a positive shift towards gender inclusivity in the field, signifying progress towards more diverse and equitable extension services.

Secondly, the age distribution of the personnel highlighted a predominantly youthful workforce, with most falling within the age range of 38 to 47 years. This youthful composition is good for the integration of digital technologies, as younger individuals tend to be more adaptable and open to innovation.

Moreover, the educational qualifications of the extension personnel were notably high, with the majority holding Bachelor's degrees or High National Diploma. This level of education equips them with the requisite skills for effective information dissemination and the potential to readily embrace digital tools and techniques. Marital status and household size emerged as significant determinants of training needs. Married personnel with larger families expressed a stronger desire for training, likely driven by increased responsibilities and the need for higher income to support their households.

Membership in professional organizations was widespread among extension personnel, facilitating knowledge exchange and networking. This collaborative aspect of their work may contribute positively to the adoption of digital technologies.

However, a critical observation was the relatively low-income levels of these personnel, which could potentially limit their capacity to invest in digital tools and training independently. This underscores the importance of external support and incentives to bridge the financial gap and promote digital technology adoption. Additionally, we found that longer work experience was associated with lower training needs, suggesting that experienced personnel may have received prior training or developed practical expertise over time. Nevertheless, continuous training remains essential to keep up with evolving digital technologies and practices.

Furthermore, smartphone ownership was prevalent, while laptop or iPad ownership was less common. This highlights the need for organizations to provide extension personnel with the essential digital tools required for efficient and effective service delivery.

Lastly, the study identified significant skill gaps in various digital domains, emphasizing the urgency of tailored training programs. Areas such as digital technical skills, data analysis, content creation, ethics, multimedia production, and video library management exhibited substantial room for improvement.

Recommendations

The study made the following recommendations:

1) The management of Agricultural extension organizations in South-East, Nigeria especially the Agricultural Development Programms (ADPs) should work with the relevant stakeholders to increase the salaries of extension personnel as a way of motivating them to accept changes in their work procedures such as accepting the use of digital technologies in their work.

2) The Management of extension organizations should design and implement digital training programs to close the current gap in digital skills among the personnel.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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