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# KEBBI JOURNAL OF AGRICULTURE AND NATURAL SCIENCES (KEJAANS)

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# EVALUATION OF TECHNOLOGIES USED TO ACCESS INFORMATION ON KNOWLEDGE MANAGEMENT IN AGRICULTURAL EXTENSION IN NORTHWESTERN NIGERIA

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**ABSTRACT**
The study evaluated the technologies used by extension workers to access information on Knowledge Management utilisation in agricultural extension services delivery in Northwestern Nigeria. A sample size of 278 respondents was drawn from population of 1774 Extension Workers. Structured questionnaire, Focus Group Discussions (FGD) and interview were used for data collection. Multi-stage sampling technique was employed for the study. Three States were purposively selected in the Northwestern Nigeria: Kaduna, Kano and Kebbi. All the Agricultural Development Project (ADP) Zones were also purposively selected from the three (3) States and the extension workers sampled through preliminary surveys using convenient and non-probability sampling technique. Descriptive statistics, and participatory research approach (PRA) were used as tools for analysis. The result of the study indicated that substantial number of Extension Workers (28.78%) use a synthesised of participatory approaches to accessing Information on Knowledge Management. On the pair wise ranking, technologies used as channel of communication to access Agricultural Information on Knowledge Management, The result revealed that, use of internet as channel of communication was more preferred compared in turn with other technologies and ranked first on the list with a total of 264 in the matrix than any other technology used and use phone to accessed agricultural information was less preferred technology scored (43.5 points) and picture (55 points) respectively. The effective utilization of KM in agricultural extension service will boost agricultural production and food security in Northwest and Nigeria as a whole. It was recommended that training and re-training of Extension Agents in Knowledge Management and ICT tool should be encouraged in Extension organisations at all levels (Federal, State and Local Government) in order to improve Agricultural Extension service delivery. In conclusion, until extension professional best utilised Knowledge Management in agricultural extension service delivery to achieve success of effective agricultural information dissemination to rural farmers in turn to increase agricultural productivity and national food security in north-west Nigeria.

Keywords**:** Knowledge Management, Agriculture, Extension Workers, Technology, Utilisation

## Introduction

Agricultural extension service delivery is fundamental to agricultural sector and national development to any nation. Therefore, agricultural extension workers need to be proactive and effective in their job performance of information dissemination to the farming family. In achieving an effective performance of agricultural extension workers towards sustainable agricultural development, and global food insecurity, there is need for proactive effort. In searching for alternative system of extension to boast agricultural production, there's an urgent need for "Knowledge Management" extension system which has the potential for accessible and affordable strength in agricultural extension service delivery. According to World Bank, (2016) until the early 1970s, Nigeria was relatively self-sufficient in food production, and agriculture was the main source of foreign exchange earnings. Following the discovery of oil at Oloibiri in 1956 in the present Bayelsa State, agriculture sector became stagnated as resources were shifted to develop the petroleum industry (World Bank, 2016).

Historically, the concept of Knowledge Management was introduced in Nigeria to the agricultural sector in 2013 to boost agricultural production. Thus, extension workers were trained in Knowledge Management systems for effective extension services delivery. However, extension services delivery remains predominantly the traditional extension system through Training and Visit (T and V), Farmers Field School (FFS) and Participatory Extension methods in disseminating agricultural information to the farming communities in north-western States of Nigeria, (SADP, 2019).

Given the urgent need for the current Agricultural Knowledge and Information System (AKIS) by extension workers, the use of conventional communication channels such as farm/home visits, personal letters, and use of contact farmers for disseminating agricultural information became imperative. This is because the entrenched T and V extension approach is becoming less effective in the face of changing government policies and dwindling financial resources (Ajayi, Alabi, & Akinsola, 2013). However, it is pertinent to construe that Knowledge Management through Information Communication Technology (ICT) application in Agricultural production in Nigeria remains low in comparison with several African countries. This is further stressed by FAO (2012) that quite number some of the Sub-Saharan African countries, notably: Kenya and Tanzania, small-holder farmers have technology-related advice as well as location for specific market information on inputs and outputs through ICT kiosks on mobile telephone services and Knowledge Management systems.

In 2014, a similar method was introduced in Nigeria but could not be sustained by the Federal Government and extension organisations due to several factors as affirmed by Sheriff, Sule, Abubakar, Maikasuwa, & Agbomakha (2020), that the lack of top management support; lack of effective communication system; organisation culture (inadequate IT and internet facilities in the Organisation); lack of separate budget for KM programmes in the organisation; lack of training on KM; and resistance to change or unyielding behaviour to change from traditional extension system to KM are some of the factors affecting Knowledge Management extension system. In a related development, the United Nations Development Programme (UNDP) and Bill and Melinda Gate Foundations (BMGF) commenced the development of the KM

framework in November 2014. This development spurred the establishment of dialogue and interactions with major stakeholders and was finally endorsed in March 2015 (FMARD, 2015), to training extension workers on use of Knowledge Management extension system for effective and efficient extension service delivery.

## Research Methodology

### Sampling Technique and Sample Size

Multi-stage sampling techniques were employed for the study. In the first stage, purposive sampling was used to select three (3) North-west States of Nigeria, notably; Kaduna, Kano and Kebbi States. The States are selected because of their accessibility, availability of extension services, and as well due to insecurity. All the Agricultural Development Project (ADP) Zones were purposively selected from the three (3) States as the major extension adversary in the study area. The Extension Workers were also sampled through preliminary surveys using convenient and non-probability sampling technique to select agricultural extension workers. The choice of this sampling technique is because agricultural extension workers were hardly found in their job stations, this is largely due to the nature of the jobs. Therefore, the study involved respondents who would be found in their workstations and are ready to participate in the survey. Besides, the snowball sampling technique was employed in areas with security challenges using web 2.0 technologies to get across to the extension workers. Focus Group Discussions (FGD) were equally employed for interview where the respondents must rank these technologies used in regard to their importance. The result of this method provides the starting base for discussions on possible solutions to the priority technology used to access agricultural information in KM utilisation (Perspective, 2023). A total number of 57 extension Workers was interview using FGD in five locations (Argungu, Yauri, Samaru-Zaria, Ciromawa and Garko).

To obtain the desired sample size, a simplified formula for the proportions by Yamane (1967), as cited in Study.com (2022) was adopted. The formula was adopted assuming a 95% of confidence level and precision of 0.05.

The resulting sample size was:

$$n = \frac{N}{1+N\,(e^2)}$$

Where;

n = is the sample size,

N = is the population size = 1774

e = is the level of precision (sampling error) = 0.05

When this formula is applied to 1774 population of extension workers in the study area, it gives,

$$n = \frac{1774}{1 + 1774\,(0.05^2)}$$

Sample size (n) = 278

Hence the sample size is 278.

Target population and sample frame from each State and ADP Zones is illustrated in the table below.

Table 1: Sampling Technique and Size

| State | Zone | Sample Frame | Sample Size |
|---|---|---|---|
| **Kebbi** | | **166** | **31** |
| Argungu | Zone 1 | 38 | 7 |
| Bunza | Zone 2 | 28 | 5 |
| Zuru | Zone 3 | 84 | 15 |
| Yauri | Zone 4 | 16 | 4 |
| **Kano** | | **1376** | **205** |
| Rano | Zone 1 | 550 | 82 |
| Danbatta | Zone 2 | 330 | 49 |
| Gaya | Zone 3 | 496 | 74 |
| **Kaduna** | | **232** | **42** |
| Tudun Saibu | Maigana Zone | 80 | 14 |
| Sabon Birni | Lere Zone | 38 | |
| Saminaka | | | 7 |
| Samaru – Kataf | Samaru Zone | 60 | 11 |
| Birni Gwari | Birni Gwari Zone | 54 | 10 |
| **Total** | | **1774 Ext. Worker** | **278 Ext. Worker** |

Source: Field Survey, 2024

**Results and Discussions**

**Means of Accessing Information on Knowledge Management**

Result presented in Table 2 indicated that substantial number of Extension Workers (28.78%) use a synthesised of participatory approaches; participatory video shows, participatory communication (PC), SMS, telephone calls, workshop, and conferences to access information on Knowledge Management (KM). This is closely followed using workshop to access information. It was evident that 15.83% used SMS and phone calls to vacillate their activities as shown in the table above. Furthermore, 9.35% used participatory communication (PC) for information on KM, while 6.48% of Extension Workers used participatory approaches like participatory video shows and conference, respectively. More also an insignificant number used radio (1.08%) to access information on KM in the study area.

The findings corroborates with the work of Suleiman & Abubakar, (2021) who reported that, there is no specific tool dedicated for extension workers use in formalising with Knowledge Management. The work of other authors (Mtega & Msungu (2013) and Sanga *et al.*, (2013a) cited in Alcardo *et al.*, (2017)) further expressed that, Extension Workers also use participatory communication approach and conferences to acquit themselves with Knowledge Management in the field of Agricultural Extension services who found that, mobile phones and radio are very suitable for the provision and dissemination of agricultural information to/among farmers. Thus, the current study indicated that majority of Extension Workers use a combination of Participatory approaches like Participatory Video shows, Participatory Communication (PC), SMS, and telephone calls, Workshop and Conference to access information on Knowledge Management (KM). Though, few Extension Workers use Workshop, SMS, phone calls, and Participatory Communication (PC) to accesses information on KM, while others use Participatory Video shows and,

Conferences and Radio. In this regards, Pair wise ranking is often used by social scientists, and increasingly by community development workers, as a means of prioritising or ranking lists prepared by communities (Tim Russell, 2001).

Table 2: Means of accessing information on Knowledge Management (n = 278)

| Variable | Frequency | Percentage (100%) |
|---|---|---|
| Participatory like participatory video shows | 18 | 6.48 |
| Participatory communication (PC) | 26 | 9.35 |
| SMS, and telephonic calls | 44 | 15.83 |
| Workshop | 75 | 27 |
| Conference | 18 | 6.48 |
| Combination | 80 | 28.78 |
| Radio programme | 3 | 1.08 |
| Not indicated | 14 | 5.04 |

Source: Field Survey, 2024

**Pair Wise Ranking of Technology Used as Communication Channel to Access Agricultural Information**

Pair wise ranking is used for each item on a list and compared in a systematic way with each other in provision of such a method. Table 3 revealed the pair wise ranking of technologies used as channel of communication to access Agricultural Information on Knowledge Management; each technology was compared in turn with other technologies. Thus, the "use of internet" was compared first with "use of e-mail". The Extension Workers found that the "use of internet" was more preferred than "use of e-mail". From the above, score '1' in the cell of the "use of internet" on row under internet and score 0 in the cell "use of e-mail" in the column under e-mail. This was repeated with the next technology "use of internet and e-discussion". Same procedure was applied and "use of internet" was still preferred and "1" and "use of e- discussion" scored 0. The same procedure was repeated for all the technologies; in the case of comparing "use of internet" and "community radio", "use of internet and use of community radio" was equally preferred and equal marks (0.5) were scored for each technology "use of internet" scored "0.5" in the row and "use of community radio" also scored "0.5" in the column under community radio. This was repeated until all technologies have been compared with "use of internet" in the row.

The same process was applied to each technology, and various scores were obtained. On the second row, "use of e-mail" was then compared with the next technology, "e-discussion" In this case "use of e-mail" were less preferred than "use of e-discussion" and so a 'use of e-mail" scored "0" and "e-discussion" scored "1" in the column. All subsequent technologies were compared with "use of e-mail". The process was repeated for all the technologies until all possible comparisons had been made as well and various scores recorded against each technology to complete the matrix. The number of times a technology had been found to be more preferred was measured by counting the number of scores in the row each technology had scored in the matrix. Therefore, the technology that appears to score higher point is reported to be the most preferred technology. In this study, the technology that scored high points, the "use of internet" appears to have scored more points (264 points) in the matrix than any other

technology use. It was therefore, considered to be the most preferred technology used by the Extension Workers, this was closely followed by surfing the agricultural portals to access agricultural information (224 points). The use of Community radio with (182 points) and television to access agricultural information scored (126 points). And the use of chat room (social media) to access agricultural information scored 115 points and phone to accessed agricultural information was less preferred technology (43.5 points) and picture (55 points) respectively.

The Pair wise ranking in which each item on a list is compared in a systematic way with each other provides such a method. The result of the study revealed that, use of internet and surfing agricultural portals as channel of communication to access agricultural information on Knowledge Management was the most preferred compared in turn with other technologies and ranked first on the list with a total of 264 and 126 respectively. This implies that if internet facility is provided in all Agricultural Development Project (ADPs) offices and the extension workers were given more opportunities and training, Knowledge Management has the potential strength to effectively and efficiently improving on agricultural extension service delivery in the study area. The result is contrary to the work of Ajayi *et al*, (2013), who opined that extension worker had more knowledge on the use of mobile phone, and e-mail. It is also contrary with Ajayi *et al*., (2013) whose finding showed that mobile phone, computer for word processing and electronic mail was the commonest information technology used by extension agents. This is an indication that extension workers have gained more experience in the use of ICT tool, using internet and agricultural portals to source Agricultural Information rather than sending and waiting for replies through emails for agricultural information. According to National Institute of Agricultural Extension Management (NIAEM) (n.d) as cited in Suleiman (2019), the emergence of information and Communication Technology (ICT) in the last decade have opened new avenues in Knowledge Management that could play important roles in meeting the prevailing challenges related to sharing, exchanging and dissemination of technologies to farmers. The use of appropriate methods, messages and tools of education and information is of paramount importance in extension. Competency of extension professionals was evaluated based on how familiar they are with various and emerging ICTs and other communication tools and methods and how effectively they use these tools and methods in their routine work (Feed the Future & USAID, 2015).

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Table 3: Pair Wise Ranking of Technology Used as Communication Channel Access Agricultural Information on Knowledge Management

| Tech | Inter-net | E-mail | E-dscu | ChatR (SM) | Agric.portal | Com. Radio | SMS/ MMS | Video | Picture | Phone | Total | Rank |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Internet** | - | 1*34=34 | 1*26=26 | 1*29=29 | 1*35=35 | 0.5*28=14 | 1*27=27 | 1*39=39 | 1*32=32 | 1*28=28 | 264 | 1 |
| **E-mail** | 0*39=0 | - | 0*26=0 | 1*28=28 | 0*24=0 | 0*21=0 | 0.5*27=13.5 | 0*29=0 | 1*31=31 | 1*25=25 | 97.5 | 7 |
| **E-dscu** | 0*29=0 | 1*27=27 | - | 0*32=0 | 0*28=0 | 0.5*23=11.5 | 0*25=0 | 0*25=0 | 0.5*26=13 | 0.5*33=16.5 | 68 | 8 |
| **ChatR (SM)** | 0*25=0 | 0*31=0 | 1*31=31 | - | 0*30=0 | 0.5*26=13 | 0.5*30=15 | 1*22=22 | 1*28=28 | 1*31=31 | 112 | 5 |
| **Agric. Portals** | 0*26=0 | 1*22=22 | 1*28=28 | 1*32=32 | - | 1*23=23 | 1*35=35 | 1*35=35 | 1*24=24 | 1*25=25 | 224 | 2 |
| **Com. Radio** | 0.5*28=14 | 1*18=18 | 0.5*29=14.5 | 0.5*26=13 | 0*26=13 | - | 0.5*30=15 | 1*40=40 | 1*33=33 | 1*22=22 | 182.5 | 3 |
| **SMS/MMS** | 0*36=0 | 0.5*31=15.5 | 1*27=27 | 0.5*25=12.5 | 0*29=0 | 0.5*24=12 | - | 0.5*26=13 | 0.5*32=16 | 0.5*29=14.5 | 110.5 | 6 |
| **Video** | 0*24=0 | 1*27=27 | 1*32=32 | 0*25=0 | 0*28=0 | 0*35=0 | 0.5*28=14 | - | 1*24=24 | 1*29=29 | 126 | 4 |
| **Pictures** | 0*31=0 | 0*25=0 | 0.5*33=16.5 | 0*27=0 | 0*22=0 | 0*34=0 | 0.5*26=13 | 0*28=14 | - | 0.5*26=13 | 43.5 | 10 |
| **Phone** | 0*35=0 | 0*22=0 | 0.5*27=13.5 | 0*26=13 | 0*24=0 | 0*31=0 | 0.5*30=15 | 0*28=0 | 0.5*27=13.5 | - | 55 | 9 |

**Key:** E-dcus – E-discussion, ChatR (SM) – Chart Radio (social media), Agric.portal – Surfing Agricultural portal, Com. Radio – Community Radio. In comparison, preferred technology score 1 point compared to Un-prefer technology score 0. If both compared technology are equal, then each score 0.5 point.

**Source:** Field Survey, 2023

**Conclusion and Recommendations**

The findings revealed that there is no specific tool dedicated for extension workers in formalising with Knowledge Management. Though, more than half of the extension workers use combinations of participatory approach (such as field day, group discussion, demonstration etc). In a Pair wise ranking, which each item on a list is compared in a systematic way with each other. This provides the use of internet to access agricultural information on Knowledge Management was more preferred compared to other technologies. This study provides an insight on the utilisation of Knowledge Management for effective agricultural extension service delivery among agricultural extension professionals. In conclusion, effective agricultural information dissemination to rural farmers in North-West Nigeria will remain elusive unless agricultural extension professionals effectively utilize Knowledge Management. This approach is crucial for enhancing agricultural productivity and ensuring national food security.

Based on the findings of the study the following recommendations on how to improve Knowledge Management utilisation in agricultural extension services in the study area are made; Training and re-training of extension agents in Knowledge Management and ICT tools should be encouraged in extension organisation at all level (Federal, State and Local Government Areas) in order to improving on agricultural extension service delivery. More emphasis should be given to funding of agricultural extension services; this will also be strengthening and improving on capacity building as well as improves on effectiveness of agriculture extension workers. The Extension Workers should be provided with logistic like; transport facilities, offices with well-equipped facilities to enhance effective performance. These include adequate motorcycles, vehicles, information communication technologies (ICT) and others that can assist them to perform their roles smoothly.

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