

**UTILISATION OF INFORMATION AND COMMUNICATION
TECHNOLOGIES FOR AGRICULTURAL EXTENSION SERVICE DELIVERY
IN PUBLIC AND NON-PUBLIC ORGANISATIONS IN SOUTHWESTERN
NIGERIA**

BY

AYOTUNDE OLAYINKA OWOLABI

MATRIC No.; 129398

B. Tech (Agricultural. Economics & Extension. (LAUTECH)

M.Sc. Agricultural Extension and Rural Development (University of Ibadan)

**A Thesis in the Department of Agricultural Extension and Rural Development in
partial fulfilment of the requirements of the Degree of**

DOCTOR OF PHILOSOPHY

of the

UNIVERSITY OF IBADAN

APRIL, 2021

CERTIFICATION

I hereby certify that this study was carried out by OWOLABI, AYOTUNDE OLAYINKA, in the Department of Agricultural Extension and Rural Development of the Faculty of Agriculture and Forestry, University of Ibadan, Ibadan, Nigeria.

Supervisor
Dr. O.T. Yekinni,
B.Sc, M.Sc, Ph.D (Ibadan),
Department of Agricultural Extension
and Rural Development,
University of Ibadan,
Ibadan, Nigeria.

DEDICATION

I dedicate this project to The Lord God Almighty, The Glory and The Lifter of my head, who in His infinite mercies and loving kindness has been my very present helper in times of need all through the period of this research and will be afterwards. Thank you Lord!

ACKNOWLEDGEMENTS

First and foremost, I want to return all the glory back to my MAKER, Yahweh of Judah, The Alpha and Omega, my Redeemer and my Helper for granting me the extravagance grace from the beginning of this programme till the end. I say Thank You to My One and Only '*Olowogbogboro*'.

Greatest thanks to my wonderful supervisor, Dr. O.T. Yekinni for your great patience, meticulous scrutiny, special attention to details and immeasurable assistance, guidance and selfless supervision and your thoroughness on my work. You are greatly appreciated and I will always remember you for good all the days of my life, thanks so much again and again sir.

I highly appreciate all my lecturers in the Department with special reference to Prof. O. B. Oyesola, Dr. O.S. Fadairo, and Dr. K.A. Thomas your priceless contribution to my work cannot be over-emphasised at every stage, your objective criticism and invaluable suggestions has helped a great deal in giving more depths to my study, sincerely grateful and remain lifted in Jesus name. Prof. L. A. Akinbile, Dr. B. R. Olajide, Dr. N. S. Olutegbe, Prof. A. E. Adekoya, Prof. S. O. Odebode, Prof. M. K. Yahaya, Dr. S. A. Tijani, Dr. O. A. Adeleke, Dr. O. E. Adalakun, Dr. M. F. Oyewole, Dr. B. O. Badiru and Prof. M. G. Olujide for their immense contribution to my work, may God bless you richly beyond human comprehension. Specially, I deeply want to appreciate the Head of Department Prof. J. O. Oladeji, for your fatherly encouragement, advise and moral support always, I pray that God's everlasting mercies shall never depart from your life.

My utmost appreciation goes to my wonderful parents Mr. and Mrs. J. O. Abe for their unending love, prayers, care, financial and moral support at every point in time; you're simply the 'BEST'. Having you as my parents is a great and rare privileged and I greatly appreciate you for your wonderful support all through. Remain lifted and blessed forever and may you live long to eat the fruit of your labor over me by Gods special grace. Also, my unique gratitude goes to my elder sisters and brother, Dr. Mrs C.O. Ajanaku, Dr. Mrs I.E. Aibinu, Mrs. O.O. Olasore, Pst Mrs O.A. Oladipo along with their husbands, Prof. K.O. Ajanaku, Mr. T.A. Aibinu, Mr. A.A. Olasore, Pst. O.C. Oladipo and

Dr. Samuel Abe, greatly appreciate you for your unflinching support, love and encouragement all the way. God bless you abundantly.

I will not fail to mention valuable people who has not only inspired me when the road was very rough but created time out of their time to give a listening ear, shoulder to cry on and bore me in their hearts all through this period: Reverend and Pst. Mrs. F.A. Ayodele, (I greatly appreciate you sir and ma, you're a blessing to this generation, God bless you lavishly). Deacon and Dr. F.A. Yusuf, you're a rare family friend and very loving; in short meeting you is one of the blessings I will always live to recount all the days of my life. Thanks for your loving support in cash and in kind all through this period and beyond, may God reward you with His blessings that makes rich without any sorrow added to it, love you so much). Dr. and Mrs S.A. Adegebo, Mr and Mrs P. O. Oladoyinbo, Prof. and Mrs M.O. Bamiro, Dr. E.A. Kolawole (I can never forget the number of times you invested on my work before my pre-data seminar, all those times you'll tell me I was disturbing you too much with my work, thanks a lot and may God bless you). Dr. A.O. Ajala, Dr. Mrs A.G. Adeyonu, Dr. B.O. Ajiboye, Dr. S.K. Obaniyi, Prof. .J.A. Akangbe, Dr. A.S. Olutegbe and Dr. A. A. Adejumo (you're a rare breed), Dr. Segun Oyelami (you're a rare gem and a blessing indeed, I salute you forever in my heart sir), Dr. L. A. Oyebode (aka Abbey Baba, you're indeed my God-sent helper, can never forget those days of little beginnings, deeply appreciate), Dr. and Dr. Mrs O. O. Alabi (my loving and caring neighbour, bless your heart sir and ma), Dr. and Mrs T.E. Asani (remain ever blessed, thanks for those special times you accommodated my children, whenever there was need for me to be away, may God bless), Dr. and Mrs. S.O. Ikubanni (may the good Lord remember you for good always), Dr. K.N. Adegun and Mr. W.A Oshodi (I can never forget those times we had like 4 to 5 hours of brainstorming on how to reframe a section of my PhD questionnaire and bringing all my children to your house for the exercise, it was a tug of war that day but I really appreciate your longsuffering and support all through may God bless you richly). Mr. and Mrs. A. A Lanre (you are a God-sent to my family, for your loving accommodation and care for the children while I was away, may God enlarge your coast on all sides in Jesus name). Mr. and Mrs. G.A. Olujobi (my children's head teacher, you're a woman of valour and substance, thank you for accommodating my children severally while away for this programme, I greatly

appreciate and celebrate you and may God bless you real good in Jesus name). Mary, thanks so much for your heart of gold, you're a God-sent to me and my family, may God prosper you exceedingly. Debola, Feyi, Pst. I. I Sunday, Mr. Aregbe, Dr. T. A. Oladigbolu (I really appreciate you for your great assistance on my work especially before my pre-data seminar, your deep clarifications were so outstanding, may God bless you abundantly). I also appreciate Pastor Praise Ayodele and family, Mrs Tofunmi and her family for their wonderful hospitality during my field work, may the Lord enlarge your coast and keep you always in Jesus name. Mrs C.O. Afolabi (my sweet sister from another mother, love you so, so sweetly. Got to know you much better during the AESON 2019 conference at Abuja and my life had experienced tremendous transformation ever since then, may God's favour and kindness never depart from your life and family ma), Dr. Mrs. R.T. Adeniyi (loving research team leader, I salute you ma), all research team members (you guys are just great).

My supreme appreciation goes to my one and only Honey Prince Dr. Sola Owolabi, my sweetest, loving, cheer leader, guardian, mentor, friend, husband and pastor. You've made a lot of significant impact in my life since the day I met you. I deeply appreciate you for your great assistance physically, spiritually, financially, academically, emotionally, career-wise and every-wise. My heart blesses you all the time for your extraordinary support, encouragement, counsel and overwhelming love all through. I remembered when I got pregnant with our third baby and I was preparing to do my MPhil/PhD conversion, I wanted to opt out of the programme but you insisted that I should continue and you thereafter prayed for me that God should strengthen me all through. You're one in a million out of all the men that I have seen on earth as you were not intimidated by your wife's progress but even supported me to launch higher. I pray from the depth of my heart that the Lord shall exhort your horn like that of the unicorn and cause you to ride upon your High places dinning with Kings and queens and pray that we shall live long to enjoy ourselves till old age and even in eternity in Christ matchless name. I love you forever and ever my sweetest Honey prince.

Finally I want to give three hearty hugs to my lovely angels, I mean Aaron, Sharon and John, you are all simply amazing, loving and wonderful children. Thanks for your great understanding always, like leaving you for days and still throwing yourself on

me with all sense of joy and excitement every time I come back. May God's favour and mercies never depart from your life in Jesus name. I want you to know you're real blessings to my world and you're deeply loved and celebrated, may God bless and keep us forever in His unending love.

Above all, I want to return all the glory to my Helper, my Fortress, my shield, my buckler, my High Tower, my Strength, my Protector, my Provider, my Song, my Lord and Saviour, who hath continually upheld me when I was weary, tired, discouraged, sad at a point but my redeemer revived, sustained and decorated me with His ever-abiding love. I'm eternally grateful to you sir. For your supreme love over me and my family, I return all the glory back to your name. '*E se Baba*', '*Nagode*' '*Dalu Eze*'.

ABSTRACT

The challenge of extension service delivery in the contemporary world requires the use of versatile tools like the Information and Communication Technologies (ICT). Effective use of ICT tools for extension service delivery mostly depend on funding by the extension agencies, however disparities exist in the funding of public and non-public extension organisations. Studies on use of ICTs for extension delivery have rarely focused on the differences that exist between extension organisations along public and non-public dichotomy. Therefore, utilisation of ICT for agricultural extension service delivery in public and non-public organisations in southwestern Nigeria was investigated.

A three-stage sampling procedure was used. Four states: Oyo, Ondo, Ekiti and Ogun States were purposively selected due to presence of notable Public Extension Organisations (PEO) and Non-Public Extension Organisations (NPEO). Using total sampling, all extension practitioners in British American Tobacco, United State Agency for International Development and Justice Development and Peace Commission were selected to give a total of 41 respondents for NPEO. From Agricultural Development Programmes of selected states, 124 respondents were randomly sampled to represent PEO. Structured questionnaire was used to elicit information on respondents' personal and professional characteristics, access to ICT, frequency of use, knowledge of use and relevance of ICT tools, perception of use of ICT, constraints to access and use of ICT. Indices of ICT knowledge (low: 8.00-23.59, high: 23.60-35.00), access (low: 1.00-15.19, high: 15.20-27.00), use (low: 5.10-93.54, high: 93.55-443.00), relevance (low: 28.00-61.70, high: 61.71-77.00) and perception (unfavourable: 51.00-79.20, favourable: 79.21-104.00) were generated. Data were analysed using descriptive statistics, t-test and linear regression at $\alpha_{0.05}$.

Respondents' ages were 40.44 ± 10.20 and 39.91 ± 8.33 years for NPEO and PEO, respectively. Years of professional experience was higher in PEO (10.29 ± 8.24 years) than in NPEO (9.05 ± 6.59 years) and more respondents in NPEO (53.7%) had exposure on ICT through in-house training compared to PEO (38.7%). Highest educational qualification for NPEO was Bachelor's degree (48.8%), while it was HND (40.3%) for PEO. Access, frequency of use and knowledge of ICT was low for 60.5%, 82.3% and 50.0% in PEO, while it was high for 73.2%, 63.4% and 68.3% in NPEO, respectively. More respondents (61.0%) in NPEO than in PEO (55.6%) rated ICT tools as relevant for extension activities. Respondents from NPEO (61.0%) had favourable perception of ICT tools, while 49.2% in PEO were favourably disposed to ICT tools for extension activities. Use of ICT was significantly higher in NPEO (34.80 ± 11.45) than PEO (29.65 ± 11.10). In PEO, the major constraints to use of and access to ICT were lack of financial resources (1.89 ± 0.36) and interrupted power supply (1.92 ± 0.46), while in NPEO, computer education (0.93 ± 0.72) and low financial resources (1.22 ± 0.82) were the corresponding constraints. Constraints to access (14.10 ± 3.17) and use of ICT tools (10.84 ± 3.30) was significantly higher in PEO compared to access (9.80 ± 5.25) and use of (5.31 ± 5.08) in NPEO. Respondents' years of professional experience significantly increased ICT use ($\beta = 0.043$) in NPEO.

Access to and use of information and communication technologies were higher in non-public than public extension organisations in southwestern Nigeria.

Keywords: Extension practitioners, Agricultural extension service delivery, Information Communication Technology tools, Extension organisations

Word count: 492

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ACRONYMS

ADP	-	Agricultural Development Programme
AFCOT	-	African Cotton Association of Nigeria
AGIS	-	Agricultural Geographical Information Systems
APS	-	Agricultural Performance Survey
BAT	-	British American Tobacco
DADP	-	Diocesan Agricultural Development Project
DEC	-	Development Education Centre
FAO	-	Food and Agricultural Organisation
FACU	-	Federal Agriculture Coordinating Unit
FADU	-	Farmers Development Union
FFS	-	Farmers Field School
FMARD	-	Federal Ministry of Agriculture and Rural Development
GIS	-	Geographical Information Systems
GSMA	-	Global Service for Mobile Agriculture
ICTs	-	Information and Communication Technologies
ICT4D	-	Information and Communication Technology for Development
JDPC	-	Justice Development and Peace Commission
NAERLS	-	National Agricultural Extension and Research Liaison Services
NARS	-	National Agricultural Research System
NCC	-	Nigeria Communication Commission
NEPAD	-	New Partnership for Africa's Development
NEST	-	National Environmental Study Team
NGOs	-	Non-Governmental Organisations
NPEO	-	Non- Public Extension Organisation

NRDC	-	National Resource Defence Council
PEO	-	Public Extension Organisation
REFILS	-	Research Extension Farmers Input Linkage Systems
SG	-	Sasakawa Global
TCRA	-	Tanzania Communications Regulations Authority
USAID	-	United State Agency for International Development
WIA	-	Women in Agriculture
WHO	-	World Health Organisation
WOFAN	-	Women Farmers Advancement Network

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

The contemporary world has gradually transformed into an information community. The rate at which information is being used across various human capacities has been greatly influenced through the use of various technologies to provide information in a manner that is hitherto unknown. Information serves as a pivotal key in the various human processes such as economic, political and social development. Charting the way information is being managed and accessed nowadays, to pursue development agenda is unprecedented. Information and Communication Technologies (ICTs) have been noted to play major role in the pursuit of development activities through information dissemination strategies in several countries. This strategy has continuously gained the attention of the United Nations overtime and had led to active cooperation been established with sponsors, private organisations, ad hoc groups and government organisations so as to improve United State government support with collaborations in the implementation of the strategies studied by National Resources Defence Council, (2013).

The ICTs comprise of a diverse set of equipment, services and applications used to create, manage, disseminate and exchange information United Nations Information and Communication Technologies, (FAO, 2017). The ICT sector is made up of various sectors which includes radio and television broadcasting, computer services, software and hardware of computer, as well as the electronic mail and internet which is a composite of the electronic media (Nyarko, Kozari and Josef, 2021). The requirements of information and communication can also be fulfilled by using the conventional ways depending on the context, which could be through forms such as print media, fixed telephone lines, telegraphs, audio and video cassettes, films and slides. Conventional way of information communication has proven to be useful to a considerable number of persons all over the world, especially those people living in the countryside where latest advancement in information technology has not yet fully reached (Aker, Ghosh and Burrell, 2016).

It's noteworthy to state that recent ways of communicating through the latest information tools have great capacity to fulfil information services which needs to be fully tapped. The phrase ICT connotes the merging of technical revolution or invention which leads to advancement of information or knowledge and as a result gives automatic variation with regards to various aspects of life such as education, business, entertainment, health, political, economic, leisure and social platforms (Okeke, Nwalieji and Uzuegbunam, 2015). Generally, there's been an increasing awareness that these technologies tend to have a huge capacity for improving the socio-economic status of the people through the provision of health care services, employment services and other economic activities as well as enhancement of networking, participation and advocacy within societies. ICTs also have the potential to improve interaction between governments and citizens, fostering transparency and accountability in governance.

1.2 Challenges of agricultural extension service delivery in Nigeria

Agricultural extension service has the mandate to link research information to farmers, through the transfer of relevant improved technologies from research to the farmers in order to improve production and productivity. The conventional agricultural extension delivery is mainly carried out by extension officers who visit farmers on the farm or at the farmers' field schools. Though in the third world countries like Nigeria, there has been a dwindling rate in the number of extension personnel to attend to farmers' need. This was depicted from literature reviewed according to Developing Local Extension Capacity (DLEC, 2019) which revealed the extension agent to farmer ratio fluctuated between 1:2000 and 1:3000 in 1980, while in 2003, it varied between 1:1000 and 1:2000. This buttresses the fact that a limited number of extension officers do cater for the need of farmers in majority of the third world countries. The Extension agent farmers ratio recommended by Food Agricultural Organisation (2000) is 1:800. In Nigeria, there are various problems militating against the advancement of agricultural extension service delivery; e.g. poor funding or poor logistic support for field staff, disproportionate of extension agent to farm family ratio and poor access to production facilities (FAO, 2017).

Considering the issue of poor funding, the position of the agricultural sector in the national economy as the largest non-oil contributor to the GDP has not been appropriately reflected. Regardless of members consensus within the African Union forum on New Partnership for Africa's Development (NEPAD) that a minimum of 10% annual budgetary allocation should go to agriculture; the budgetary allocation by Nigeria to agriculture was only 1.5% which is a sharp contrast to the agreed 10% (Aguiyi, 2019). Also, Table 1 shows inappropriate allocation of the national budget to agriculture in the last five years.

In the same vein, poor extension contact with farmers at the public extension level is quite conspicuous in Agricultural Development Programmes (ADPs) activities. Despite efforts, at the peak of the ADPs activities, to optimise the extension to farm family ratio, many farmers are yet to be reached. This is largely due to the insufficient number of extension agents providing services given the large number of farmers. For example, an extension agent-farm family ratio of 1:3000 was typical of the pre-ADP era. As the years rolled by, the ratio attained at early days in ADP has progressively been getting worse. In 1995, the ratio was 1:1,189; in 1997, it was 1:1,615 while in 2003, it was 1:1,722 (FMARD, 2016).

Recent studies reviewed from Research Extension Farmers Input Linkage Systems on Technology Generation and Dissemination of extension agent to farmers ratio, include 1:6,804, 1:6,185, 1:1,612, 1:3,076, and 1:3,600 for Oyo, Ondo, Lagos, Ekiti and Ogun states respectively (REFILS, 2015/2016). However, when this ratio is compared to what obtains in other developing countries, the country is far from being optimal; in Mexico, it is 1:800, Japan has 1:252 and South Korea has 1:500 extension agent - farmers ratio (NAERLS, 2012). It is easy to acknowledge obvious limitations to the effectiveness of extension delivery in Nigeria. The ADPs over the years are renowned for their notable approach in rendering core extension service delivery to the farmers and this has resulted into other states in the nation tuning in line with the ADP's approach. The extension transformation agenda was meant to be followed by reinforcing and empowering the ADPs with sufficient human resources such that it will give an ideal ratio of 1:800 extension agent to farm families and 1:1000 and the agenda also aims to provide improved infrastructures and facilities, facilitated by the Federal Ministry of

Agriculture and Rural Development (FMARD, 2016). As a result of this, necessity has risen to discover better ways in which a limited number of extension agents can cater for a greater number of farmers with minimal effort (Lwoga, Stilwell and Ngulube, 2011). This becomes feasible, when there is direct incorporation of the technologies within the typical agricultural extension delivery structure (Yekinni, 2011). Though radio and mobile phone constitute those technologies which are quite available and accessible to majority of people in African (Chapman *et al*, 2003; TCRA, 2011).

Another pressing issue is poor access to production facilities. This can be felt in the sense that there is still a wide gap between improved technologies available and what the small farmers have embraced, accepted and verified on their farm lands. Most of these farmers do not have adequate access to agricultural support services including farm input supplies, production credits, guaranteed market outlets among others. The main causes for the lack of access to all these facilities are not only the non- presence of the service providers, affordability, timeliness but also the technical capacity of service providers to utilise the services efficiently to the merits of the beneficiaries. These challenges have mostly weakened the extension service delivery of the public organisations especially due to the availability of very few extension workers in the country. Literature reviewed in line with Oladeji and Oyesola (2011), showed that agricultural extension is one of the major way through which ICT use could exhibit substantial influence; this is based on extension agents' interaction with farmers on relevant agricultural information exchange. Moreover, Aker *et al.*(2016),revealed that the use of ICT has been known to be applicable and economical tool in facilitating dissemination of agricultural messages and skills between client to service providers as well as other actors in agricultural industry. The significance of using ICTs with respect to electronic learning platform in receiving training on agricultural related activities have been validated over the years (Okeke *et al.*, 2015).

1.3 Categories of extension practitioners in Nigeria

Considering the various stakeholders which comprise of extension practitioners in operation in Nigeria, we have the public organisations, private commercial organisations,

Non- governmental Organisations (NGOs) and international organisations like Food and Agricultural Organisation (FAO), and World Health Organisation (WHO). Of all these stakeholders the public organisations have mainly being in operation through the ADPs establishment nationwide, as they are responsible for public extension service delivery at the grassroots. In Nigeria, the ADPs were launched almost ten years before the advent of Women in Agriculture (WIA). WIA programme came up around 1988, as it became apparent that despite the World Bank's involvement in resuscitating the country's agriculture and extension system, it was realised that the womenfolk among the farmers were scarcely reached as regard information dissemination and support received by extension agents (World Bank, 2003).

Subsequently, the WIA programmes, were initiated in already established ADPs states in 1990 so as to tackle gender-related anomalies that has been lingering within the extension programme. This was formed and carved to incorporate the female farmers into agricultural advancement process, since involvement of women farmers as beneficiaries as well as in planning and policy-making is important (Maigida, 1992). A major decline in the nation's agricultural extension system manifested with the fact that it was more or less for men and gender-bias towards women farmers. The WIA programme, was initiated as a model, was hence required to improve agricultural extension services for women. This required the reorientation of remaining home economics agents in agriculture and extension, while accentuating on women's activities.

Despite this intervention, the extension service delivery is still very limited to the women farmer basically because the number of women extension engaged in the services are few; whereas, in a traditional African setting, it is an aberration for a woman to interact with male strangers. The use of non-human interface, in the form of ICTs, has been mooted to be able to fulfil the extension service delivery to the women folk regardless of the number of male or female personnel in the services of the extension organisations (Akaki, 2013).

A significant feature in the Nigerian agricultural extension service is the arrival of non-governmental organisations in extension delivery. These NGOs mainly focuses on the agricultural and rural development sector and are subdivided into two major groups, these are namely the non-commercial commodity/community-based or faith-based NGOs

and those that are profit or commercial-based. They are responsible for the provision of vital extension education which encompasses an array of agricultural support services such as ensuring the provision of basic farm inputs, as well as procuring other credit support facilities for the target beneficiaries in various integral part of the nation. A universal study done by National Environmental Study Team, NEST (1992) revealed that a greater proportion of NGOs in Nigeria are involved in agricultural production. It is noteworthy to know that private NGOs who are involved in agricultural extension service delivery also engage in sectoral disparity with regards to concentration of efforts towards farmers. This is clearly achieved through the formulation of clear cut goals and objectives in relation to the crops and other enterprises they are involved in. This can be shown in the following proportion as 56% for crops, 14% for livestock and 10% for fisheries, in order to drive their programmes as the public extension service does. This equally explains the involvement of their extension practitioners in extension service delivery for the various sectors mentioned.

The following are examples of organisations involved in private extension services: the Shell Petroleum Company (Shell Petroleum Extension Project), the British American Tobacco (BAT), and African Cotton Association of Nigeria (AFCOT Nigeria Plc). Against BAT and AFCOT that are business oriented, the Shell and their counterparts in the oil sectors, especially in the Niger Delta, focus on community development initiatives that could assist farmers. One of the major contributions of these commercial organisations as extension service is provision of credit inform of financing or assistance in kind to promote efficiency and effectiveness. Some of the NGOs that are not profit oriented are: the Development Education Centre (DEC) that focuses on extension services at the grassroots level to address issues involving women, assisting them towards conducting themselves as an association united for self-help in the South-Eastern Nigeria. Also, in the North-West Nigeria, exists the Women' Farmers Advancement Network (WOFAN) which is mainly concerned about ensuring that women in the rural areas have access to finance by sponsoring activities that could enable rural women generate income. In the South-West Nigeria, non-profit organisations such as the Farmers Development Union (FADU) and the faith-based Diocesan Agricultural Development Project (DADP) are actively involved in programmes that could alleviate

poverty confronting farmers that are practicing at small scale levels (FMARD, 2017). An exceptional NGO among others aforementioned is the Sasakawa-Global 2000 which is an international NGO which has developed robust relationship with ADPs to the point of adopting their established structures and absorbing some of the staff of ADPs for collaborative projects. It has however been noted that most NGOs have weak linkage with public extension service and National Agricultural Research System (NARS) despite the fact that they have participatory approaches to their programmes. The only exemption is in the case pertaining to SG-2002 (DLEC, 2019).

With the foregoing, substantial incorporation of ICTs into dissemination of information systems has the capacity to minimise the cost of information, substantially for private and public organisations.

1.4 Statement of the Research Problem

Various strategies have been used in the delivery of extension service to farmers which include: group methods (farmers' field schools, demonstration plots), individual methods (private and follow-up visits) and mass media methods (broadcast through television and radio, follow-up through listening groups). Agriculture's survival in the contemporary times requires the prompt and efficient extension service in order to meet the contemporary challenges of agricultural production globally.

Extension service delivery in Nigeria has been confronted with two major challenges; firstly, the economic meltdown which has warranted incursion into farming by citizens with little knowledge of farming, leading to increasing demand for limited extension agents. Secondly is the diminishing rate of extension agents to meet the demands of the farmers which comes as a result of government insufficient financial capacity. These two challenges limit the capacity of the few extension agents to serve the farmers efficiently and effectively. Application of ICTs has been noted as being capable of amplifying the activities of the few extension agents to achieve the development goal (Yekinni, 2011).

There are several organisations whose activities support the applications of Information and Communication Technology for Development (ICT4D) innovations to attain development objectives. Presently there has been increase in the use of ICT4D

globally which cuts across every sector, such as health, education, financial, political, business as well as agriculture (Idowu *et al*, 2008). The use of ICT for information management in agricultural sector especially in carrying out the tasks of the traditional extension services has been extensively executed in several (even in developing) countries with varying degrees of intensiveness.

Potential for the development of ICTs has been greatly heightened by the improvement in Nigeria's tele-density (a measure of penetration of telephone lines within a territory) since the turn of the century. The country's tele-density which was 0.4% in 1999 increased to 107% by 2015 (NCC, 2016). As a result of this, Nigeria is well positioned to using Information and Communication Technologies for its development pursuits.

This increase in Nigeria tele-density has a spiraling effect on agricultural extension service delivery in Nigeria through the use of technologies by extension practitioners from the various extension organisations. Even though agricultural extension practitioners in Nigeria differ in capacity and potentials on the basis of organisation they work for (Madukwe, 2006). The level of use of ICT facilities for agricultural information dissemination among the practitioners of various organisation categories; private, public and intergovernmental organisations for their extension activities thus vary. Nigerian public extension organisation has used the mobile phone devices to manage input distribution for farmers. Inter-governmental organisations have introduced ICTs to facilitate market among other agricultural-related information like real time market prices and weather updates via text messages to farmers (FAO, 2015).

This research work was designed to make improvement in the method of data collection and analysis to what prior researchers have found out as regards the use of ICT in facilitating agricultural extension service delivery. Yekinni and Akinbile (2014) investigated comparative assessment of use of information and communication technologies by agricultural researchers and extensionists; Olajide and Amusat (2013) examined the use of ICTs for extension delivery in selected research institutes and ADPs, Yekinni and Olaniyi (2007) explored the analysis of e-readiness of agricultural development practitioners to emerging information challenges, while Mansour (2013) studied the diffusion and adoption of e-extension technology (computer and internet)

among extension agents in extension work. Previous studies on use of ICTs focused more on research institutes and public extension organisations and how they use these technologies in their extension service delivery. However, there is need to widen the scope of extension service delivery through the use of ICTs by investigating the various categories of extension practitioners from public, private, Non-Governmental Organisations and intergovernmental organisations.

Thus, there is need to examine the degree of use of ICTs by the practitioners of various extension organisations in order to have it explicitly documented so that there can be adequate information about deployment of ICTs for agricultural extension delivery in Nigeria. Given the foregoing, there is the need to ascertain the extent of use of ICTs by the extension practitioners of the various extension organisations for agricultural information delivery activities in Southwest Nigeria. This research work therefore will attempt to give solution to the study investigations below:

1. What are the personal and professional characteristics of the respondents' in the study area?
2. What are the levels of knowledge of the respondents' about the use of ICTs for their extension delivery activities?
3. To what extent are the various ICT tools available and accessible to the respondents' in the study area?
4. What purposes do the respondents' use each of the ICT tools for?
5. How do they use the ICT tools in achieving the specific extension delivery functions?
6. To what extent do these respondents' deem the available ICT tools relevant to their dissemination activities?
7. What are the delivery strategies used by the various categories of extension practitioners?
8. What are the perceptions of the respondents' about the use of ICTs in their activities?
9. What are the constraints that limit the respondents' access and use of ICT tools in their duties?

1.5 Objectives of the Study

The overall objective of this study is to ascertain the utilisation of information and communication technologies for extension service delivery among extension practitioners in Southwest Nigeria. The specific objectives of this research work are as follows:

1. Describe the personal and professional characteristics of the respondents' in southwestern Nigeria
2. Determine the levels of respondents' knowledge in the use of ICTs for their extension delivery activities.
3. Ascertain the various ICT tools available and accessible to the respondents' in southwestern Nigeria.
4. Ascertain the purpose to which each of the ICT tools are used by the practitioners in their extension work.
5. Ascertain the specific extension delivery functions for which ICT tools are deployed.
6. Ascertain the extent to which the various ICT tools are deemed relevant to their dissemination activities.
7. Identify the extension delivery strategies of the various categories of practitioners.
8. Examine the perceptions of the practitioners as regard the use of ICTs in their delivery activities.
9. Assess the constraints that limit their access and use of ICTs in their extension duties.

1.6 Hypotheses of the Study

H₀1: There is no significant association between the professional characteristics of the extension practitioners and their utilisation of information and communication technologies for extension delivery.

H₀2: There is no significant association between access to ICT tools by the extension practitioners and their utilisation of information and communication technologies for extension delivery.

- H₀3: There is no significant association between the constraints that limits their access and utilisation of information and communication technologies for extension delivery.
- H₀4: There is no significant association in the extension practitioners' perception on use of ICTs and their utilisation of information and communication technologies for extension delivery.
- H₀5: There is no significant association between the extension practitioners' knowledge of ICTs for dissemination activities and their utilisation of information and communication technologies for extension delivery.
- H₀6: There is no significant disparity in the use of ICT for extension delivery activities among the extension practitioners of the various organisations in the study area.
- H₀7: There is no significant disparity in the knowledge of use of ICTs for extension delivery among the extension practitioners of the various organisations in the study.
- H₀8: There is no significant disparity in the perception on use of ICTs for extension delivery among the extension practitioners of the various organisations in the study area.

1.7 Justification of the Study

The study has given an insight into the discrepancies in level of knowledge of extension practitioners from several extension organisations as regards the use of ICTs for dissemination of relevant information pertaining to agricultural activities in the country. This study has also presented the basis for distinguishing the personal and institutional factors that could be the determinants of using ICT tools by extension service providers in this study. Through these findings, policy makers could make informed decisions in relation to use of ICTs by extension workers in the field of agriculture. Consequently, accruable benefits from these policies would reflect on the farming communities being served by the extension service providers. This assertion is based on the potentials of ICTs to disseminate adequate and timely information associated with opportunities and benefits available to farming communities.

Governmental, non-governmental, global communities, agencies that offer financial support as well as executive planners in the nation overseeing extension services would find this report as a useful tool in obtaining the degree to which extension service agents use ICT in their work. Furthermore, through understanding of the variables of this study, intervention programmes on ICT for extension service providers will be properly planned in relation to how, where and when such programmes should be introduced. Moreover, the report of this study will enable the farmers to position themselves appropriately to receiving relevant and up to date information from extension practitioners in organisations that tends to use these communication tools effectively for their extension work.

The findings from this study will reveal the extent of utilisation of the communication tools among extension practitioners from public and non-public agricultural extension organisations. This was achieved through the employment of quantitative research method (questionnaire administration for the respondents) and qualitative techniques (key informant interviews with the heads of extension practitioners) of the various organisations. This could further help government owned extension organisations (Public organisations) by providing adequate enlightenment to situating the utilisation of these tools in terms of access, funding and optimal use of the tools in their extension work. Conclusively, the report gotten from this research work will significantly add to the current system of agriculture structural knowledge, as well as give relevant data to other researchers in related field of study. In related studies, chi-square, Analysis of variance and Pearson product Moment correlation were used by Oladeji and Oyesola (2011), Nyarko and Kozari (2021) used descriptive statistics and chi-square. Cynthia and Nwabugwu (2016) also used descriptive statistics. The descriptive statistics for the above studies were also used for my current study because of their relevance in quantifying the measured variables appropriately. Moreover, other inferential statistics used for my work such as linear regression analysis projected the study better by determining the level of contributions of personal and professional characteristics of extension practitioners to ICT use.

1.8 Operational Definition of Terms

Extension practitioners: These are representatives or personnel of development organisations who are involved in agricultural extension service delivery to target audiences or farmers e.g. Personnel of British American Tobacco (BAT), Agricultural Development Programmes (ADPs) and Justice Development and Peace Commission (JDPC).

Public Extension Organisation: These are extension organisations that are owned and managed by the state governments and coordinate the activities of extension practitioners and other agricultural extension service delivery to farmers.

Non-public extension organisations: These are agencies like private (BAT), non-governmental (JDPC) and inter-governmental (USAID) organisations that are engaged in extension service delivery to farmers through their various personnel representing each organisation

Information Communication Technologies: These simply describe any electronic tools that can accelerate information exchange between the sender and receiver as well as ensures prompt feedback from the receiver.e.g. radio, phone and internet.

CHAPTER TWO

2.0 LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

2.1 Historical emergence of agricultural extension in Nigeria

The Nigeria Agricultural Extension System gradually emerged from the service of exporting food crops to other countries to a more proficient professional service. The historical emergence of Agricultural Extension System in Nigeria can be categorized into three phases which are:

- a. The colonial and immediate post- independence phase: 1893 to 1968
- b. The “oil boom” phase: 1970 to 1979
- c. The state - wide Agricultural Development Project phase: 1980 to present.

Reviewing the extension strategies that distinguished each of these phases are as shown below:

a. The colonial and immediate post- independence phase which spanned from 1893 to 1968: During this period the extension strategies employed included the following:

i. Colonial commodity extension approach: This period was characterised by the uninterrupted government engagement in agricultural development. The period heralded the beginning of scientific agriculture in the country. The colonial government was then in situ and majorly encouraged growing and exportation of crops like cotton, cocoa, palm-oil, rubber and groundnuts in order to sustain the agro-industries in Europe. It was obvious at this phase that the strategy employed was the commodity approach style, and the extension delivery manifested here possesses a dual but contradictory role of education and law enforcement components (Ango, 2000).

ii. Ministry of agriculture approach: This approach began with the founding of agricultural research stations in Samaru (1921), Umudike (1923) and Moor Plantation (1924) along with the regional Ministries of Agriculture in the North, East and West (FMARD, 2017). The extension approach used here was advisory and advocacy roles which embraced input and credit distribution along with other regulatory functions (FMARD, 2017)). A significant aspect of this approach was the categorization of the

services rendered in agriculture into forestry, fisheries, livestock, etc. along with corresponding extension services. However the approach lacked adequate organisation and was non-convergence.

iii. The revitalised commodity extension (post-independence): This approach re-emphasised the choice of export crops like cocoa which was majorly produced in the old west region, with oil palm produced majorly in the East while groundnuts was majorly produced in the North. This approach abandoned production of food crops which was at a disadvantaged to the development of Nigeria (DLEC, 2019).

iv. The farm settlement or farm institute leaver's extension strategy (1959 to 1965): Studies reviewed according to (DLEC, 2019) also revealed that this approach embraced the community development view which was set to attract youths who have completed their course of study into farming so as to enable them become the ideal reference of extension service. However, this approach failed due to the rules or expectations set up in its framework which was not realisable within the structure coupled with lack of proper administration.

b. "Oil boom era" (1970 to 1979):This period was tagged as oil doom for agricultural related activities due to lack of purposeful research as well as inefficient approach to production of food crops exacerbated by the oil boom era. The major approaches of extension strategies employed during this era based on studies reviewed by Arokoyo, 1998) are:

i. National Accelerated Food Production Programme (NAFPP): This approach was adaptable and embraced the use of research, extension and input supply by operating an agro-service system with farmers marginally involved in participatory technology development.

ii. Operation Feed the Nation (OFN): This programme was initiated in 1976 in order to significantly contribute to the production of food crops in the country. This strategy however gradually dwindled away because it was not well conceptualized on a stronger basis of extension approach.

iii. River Basin Development Authority (RBDA) strategies: This approach was initiated in 1977[with the aim of meeting the irrigation needs by making use of water resources. Those involved with the execution of the approach were not assigned

extension duties till almost 1984/1985 when they were fully delegated to provide extension services to farmers within their scope of jurisdiction or areas covered by their services. However this approach failed again due to ineffective coordination approach adopted by the Ministry of Agriculture; and as a result of this their extension duties were withdrawn.

iv. The green revolution: This approach was based on the idea of Asia's success story and was initiated in 1979 in order to substitute Operation Feed the Nation. Its major aim was that of attaining self-sufficiency in the production of food crops for Nigeria within five years. However the approach could not last long due to lack of vision and divergence of efforts that could not be prolonged.

v. The pilot (enclave) Agricultural Development Programme (ADPs): The ADP extension system was initiated based on the idea that with the synergy of some fundamental factors like access to physical production units, appropriate technology, effective extension service, adequate market and other infrastructural facilities are vital to keep agriculture more inspiring and lively (FACU, 1986). They launched out as experimental projects in Funtua, Gusau and Gombe in 1975 and their feats led to the establishment of more ADP enclaves in six more states of the country. This strategy ended the oil boom era and was much more significant above the numerous approaches that reigned earlier or afterwards as those approaches couldn't bring tangible results relating to production of food crops compared to considerable increase realised by the ADP catchment areas; and the strategy employed by the ADP since has been the Training and Visit (T&V) extension style i.e. system.

c. The state-wide ADP era (1984 till present): Studies reviewed according to Arokoyo, 1998 revealed that the ADP era was distinguished with a high rise in their modus operandi which witnessed a wide federal coverage by 1989 and was saddled with the obligation of rendering extension services at the grass-root level. Features exhibited during the ADP era included on adaptive research component input delivery system, an autonomous project management unit, rural feeder roads and water supply, as well as a systematic extension delivery style of Training and Visit approach which was propounded by two scientists known as Benor and Baxter. The Training and Visit style was endorsed and supported by the World Bank in Nigeria and other developing

countries. This strategy witnessed management challenges relating to funding and administration after the withdrawal of the World Bank's support. However it has greatly assisted the extension service delivery of the nation to rise to a proficient level and also exhibited a well regimented order of structure with a degree of versatility to fill any agricultural loopholes in the country.

In 1989, the Unified Agricultural Extension System (UAES) was introduced to cater for other relevant units in agriculture like livestock, fisheries, forestry, natural resource management, etc. in order to rectify the crop-biased approach it initially started with. Also the issue of contradictory messages given by multiple agents to the farmers was neutralized with the introduction of village extension agents who has the task of discharging extension messages that covers every aspect of agricultural units to the farmers. This was done in order to make the system more profitable by eradicating replication of efforts from other non-valued sources. However this extension strategy used a top-down approach in reaching the farmers and this resulted to failure in carrying along the farmers at each stage of the extension work; hence making the farmer's contribution to technology development very minimal.

2.2 Current management of public extension delivery and other major actors in Nigeria: The public extension delivery system in Nigeria is still presently being managed by the Agricultural Development Programme (ADPs) especially at the rural level. The participation of local governments in extension delivery emerged during the democratic dispensation as the latest style in synergizing with the ADPs. However there has not being significant impact due to the inefficiency of the staff and inadequate resources of the local governments (Arokoyo, 1998).

The major strategy used by the public extension organisations aforetime and even till now is the Training and Visit (T&V) extension system, whereas the Research Extension –Farmers-Input- Linkage System (REFILS) is the administrative tool put in place to choose and organise the development of agricultural stakeholders as well as making them equal partners in agricultural development in the country. It delivers the structures and mechanisms for teamwork and proper coordination in technology generation, adaptation, dissemination and utilisation by showing distinctively what each

actor's task and obligation is in the laid down structure. Despite the fact that REFILS has aided in fortifying the weak research to extension linkage system, the private sector and farmers involvement has been noted to be low in the area of research and planning for technology development as well.

The predominant actors in extension delivery are the (States ADP who are in partnership with some Local Governments in some states) whose major task is delivering extension services to the rural people nationwide; inclusive are the National Agricultural Research System whose major task is technology development. Also there is the private sector which constitutes both the commercial organisation (who holds the task of providing basic inputs and services like loans/funds and marketing) and the Non-governmental organisations who pose as the newest actors to the agricultural extension service delivery. Policy direction by the government has always been sought out by the REFILS; irrespective of these the government policy has not been fruitful enough to support the private sectors' participation in a worthwhile sustainable agricultural development. In reference to the government policy by REFILS, there are two collaborators namely: the National Agriculture Extension and Research Liaison Services (NAERLS) of Ahmadu Bello University and the Projects Coordinating Unit (PCU) of the Federal Ministry of Agriculture and Rural Development. REFILS major characteristic is that the farmers constitute the main integral participants in the system. NAERLS is saddled with the task of providing support services in the area of extension specialists to the ADPs while the PCU is saddled with the task of coordinating, monitoring and evaluating of the activities rendered by the extension delivery system. The PCU originated from the fusion of the two establishments from Federal Department of Agriculture, the first is from a previous Federal Agricultural Coordinating Unit (FACU) and the second is Agricultural Project Monitoring and Evaluating Unit (APMEU). The introduction of non-governmental organisation into the extension delivery system of Nigeria has given the Nigerian Agricultural Extension Service a distinct feature lately.

Oladeji and Oyesola, (2011) established that private agricultural agencies could be differentiated from those categorised under NGOs as agencies that belongs to an entity or collection of persons involved in various agricultural enterprises. These Non-Governmental Organisations can be categorized into two which are: the private

commercial organisations (these are profit-oriented in nature) and the non-profit, charity or faith-based NGOs or commodity-based NGOs. The following are examples of organisations involved in private extension services: the Shell Petroleum Company (Shell Petroleum Extension Project), the British American Tobacco (BAT), and African Cotton Association of Nigeria (AFCOT Nigeria Plc). Against BAT and AFCOT that are business oriented, the Shell and their counterparts in the oil sectors, especially in the Niger Delta, focus on community development initiatives that could assist farmers. One of the major contributions of these commercial organisations as extension service is provision of credit in form of financing or assistance in kind to promote efficiency and effectiveness. Some of the NGOs that are not profit oriented are: the Development Education Centre (DEC) that focuses on extension services at the grassroots level to address issues involving women, assisting them towards conducting themselves as an association united for self-help in the South-Eastern Nigeria. Also, in the North-West Nigeria, exists the Women' Farmers Advancement Network (WOFAN) which is mainly concerned about ensuring that women in the rural areas have access to finance by sponsoring activities that could enable rural women generate income. In the South-West Nigeria, non-profit organisations such as the Farmers Development Union (FADU) and the faith-based Diocesan Agricultural Development Project (DADP) are actively involved in programmes that could alleviate poverty confronting farmers that are practicing at small scale levels (Arokoyo *et al*, 2002). An exceptional NGO among the others that were aforementioned is the Sasakawa-Global 2000 which is an international NGO which has developed robust relationship with ADPs to the point of adopting their established structures and absorbing some of the staff of ADPs for collaborative projects].

The NGOs in the Agricultural and rural development segment, makes available a variety of technical support services and extension education which includes supplying of vital inputs and micro-credit financing for diverse communities across the nation. It has been revealed through studies that a greater part of the NGOs in Nigeria are involved in agricultural production (NEST, 1992). The commercial NGOs exhibit an efficient extension delivery approach by their timely provision of important production enhancing input either in cash or in kind. Studies revealed that approaches used by most of the NGOs usually provides the opportunity for individual participation, however their bond

or relationship with both NARS and the public extension system (with the exception of FG-2002), remains frail (Arokoyo *et al.*, 2002).

2.3 Emergence of ICTs in agricultural extension service

The village level extension agent has proven to be the most effective source of information to farmers but definitely not the most efficient means as regards cost and coverage (Arokoyo,2012). The extension agent to farmer ratio at the inauguration of the ADPs across the states in the 1980s was between 1:2000 and 1:3000, this ratio however was expected to reduce to 1:800 and 1:1000 towards the time the World bank was set to withdraw its support or funding from the project. This was not achievable at all around that time. Recent studies revealed also that the extension agent to farmer ratio in Ogun State which is under South-west ecological zone was between 1:848 compared to 1:1650 in Katsina State which is under North-west ecological zone (NAERLS and PCU, 2002). This corroborates the findings which revealed that the extension agent to farmers' ratio ranges between 1:1000 and 1:2000 in the public extension service, with poorer or no statistics for women in agricultural program-where there were no female extension agents at the extension blocks created at the community level to attend to women farmers (Arokoyo, 2002).

Literature reviewed according to Ekpere (2014), showed that Training and Visit System was a farmer-oriented approach embraced at the inception of the pilot enclave of the ADPs. Along the line, there has been a considerable impact in the nation's agricultural development through the support of communication development strategy. The use of mobile cinema vans moving from one hamlet to another with the backup of few extension publications written in the villagers' local dialect, was launched at the introduction of the communication development strategy. As time went on, radio, mobile video vans and television were included with the support of the World Bank and the use of radio and television programmes increased rapidly with the expansion of the three ADP enclaves to a state-wide project across the country.

The second phase of communication development strategy was the birth of National Agricultural Technology Support Project (NATSP) of the World Bank loan facility assistance for the ADPs (Isa, Badaru, Garba and Bidoli, 2015). The units under

these projects include the radio, video and television viewing facilities which were fully developed. The rate at which the ADPs radio and television programmes were aired freely at the states and national broadcasting networks decreased considerably due to financial restraints with the commercialisation of the state and national networks. Telephones lines in analogue forms later came up and after some decades led to the advent of the Global System of Mobile (GSM). The advent of computers contributed to information processing and decision support in the 1980s. A substantial leap was brought about through the introduction of cellular phones which enabled farmers to have the right to use and dispense information they needed. Although, with the current direct extension systems operational in most third world countries, the potential of these latest technologies has not been fully utilised the way it ought to, such that the data processing capabilities of these tools could be maximised efficiently (Ekpere, 2014).

2.4 Knowledge of extension practitioners in the use of information and communication technologies for extension service delivery

Knowledge transfer by extension personnel in times past has always been interpersonal, which is either through farm and home visits, office calls and inquiries, informal contacts, as well as correspondence (Aker, 2010). In the process of time it gradually evolved into forming of farmers into viable groups so as to multiply the efforts of extension practitioners by transferring relevant agricultural information to ensuring farmers effectiveness in learning of new and current innovations related to agriculture with corresponding action. Traditional communication using media like radio, television, projectors, telephone line has been in place from the early 60's which has greatly helped in facilitating farmers understanding of agricultural information and enhancing extension personnel in rendering qualitative information and knowledge about agricultural extension services.

Recent advancements in communication evolved in the early 2000, with the use of higher technology like mobile phones, computer, internet, e mail, electronic camera, you tube videos etc. (Ezeh, 2013). All of these require the extension practitioners' capacity and potential in upgrading himself to handling these advanced technologies efficiently. Previously, extension personnel required little or no training in handling the

old communication technologies as they seem to have simple operational procedure in its use; but lately, with the recent advancement in technology use; there has been more pressure on extension personnel towards capacity building both individually and institutionally so as to enhance effective agricultural extension service delivery (Ajayi, Alabi and Akinsola, 2013). This knowledge can be acquired either through in-house training within the extension organisation organised by the agricultural extension management on relevant areas in technology use; as well as external training on information and communication technology use like degree programme acquired from higher institution, diploma training, intensive course, certificate courses.

These training has the capacity of enlightening extension practitioners on how to use computer devices such as CD ROM, DVD, memory card, flash drives in transferring messages, images and texts from the computer to other communication tools like projectors for farmers training and learning. Rudimentary knowledge on the operations and use of e- mail to send messages to farmers, digital cameras, scanners, internets, intranets, search engines like bing, “ask”, google as well as other computer components must be adequately known by giving in-depth training and exposure to the extension practitioners. Media applications on the mobile phones like WhattsApp, Facebook, Twitter and Yahoo can also be used for information dissemination when extension personnel have adequate knowledge on their operations. However, knowledge disparity among agricultural extension practitioners may be primarily due to inadequate knowledge or skills in using the available technologies and in addition as a result of extension personnel inability to access the available technologies efficiently for agricultural services (Yekinni, 2014).

2.5 Information and communication tools available and accessible to agricultural extension practitioners in Nigeria

Extension personnel in times past were introduced to very old technologies such as mobile cinema, radio, video, television and telephone in passing across useful information relating to agriculture to the farmers (Arokoyo, 2003). All these tools were readily available and accessible to extension workers, as it had no complexity in its operational use in delivering tangible information to the target audience. Studies

reviewed showed that radio and television were the most frequently used tools by extension personnel after the establishment of these old technologies; because of the broadcasting channels easily accessible to governments on the two major tools for dissemination of relevant agricultural innovations and its ability to captivate the target audience (Arokoyo, 2005). In the process of time, it was observed that the information content of the channels on radio and television was not demand driven but was supply driven based on the fact that it was government owned and as such limited other flow of information outside the government sphere, which incapacitated the advancement of agricultural extension service in Nigeria (Adebayo and Adesope, 2007). More efficient ways in reaching farmers in agricultural extension service started emerging through these new information and communication technologies such as internet, electronic mail, digital camera, computers, mobile phone, due to the fact they save more time, have a wider coverage, are cost-effective and also assist extension workers in gathering, storing, processing, retrieval and in transferring of relevant agricultural information promptly and efficiently (Bell, 2002). The accessibility of these new technologies will require the training of extension practitioners which embraces computer literacy so as to enhance the capacity of each practitioner in disseminating agricultural information adequately and efficiently (Aker, 2010). Studies further reviewed showed that mobile phones are the most accessible communication tools to extension personnel as they help in connecting with rural dwellers (Gupta, 2005) as well as help in facilitating linkage between farmers and external agencies in rendering qualitative service to farmers (Ferris *et al*, 2008). The second significant accessible tool is the internet due to its ability to quickly obtain process, retrieve, store, manage and transfer information smoothly (Munyua, 2000).

2.6 The purpose to which information and communication technologies are being used by extension practitioners

The three major purposes to which information and communication technologies are being used by extension practitioners are documentation, dissemination and information gathering purposes (Manty, 2011).

The documentation purpose of using information and communication technology by the extension practitioners entails not only the written aspect of taking cognitive

details of experiences or lectures given by researchers or subject matter specialists in a text format, but it also captures a wider range of getting detailed information about agricultural related matters from a variety of available technologies for making or sending reports. Some of the communication tools used for documentation includes tape recorder, video recorder, digital camera, computers, etc. The tape recorder is used to record relevant information shared among agricultural experts for farmers' utilisation on the farm or within farmers' group during a teaching learning situation (forum) by playing the audio messages relating to agriculture during such training sessions for the beneficiaries use. Video recorder has the advantage of getting both the audio and visual display recorded during agricultural technical sessions, as well as interview from agricultural experts or specialist can be taken on it. Digital cameras has the capacity to take still photographs, records, stores photographic images which can be viewed and manipulated in digital forms and print them for future referencing. Also images of problems faced on crops or livestock's by farmers are captured by extension practitioners using digital camera, in order to show researchers during training sessions for procuring of relevant solutions to the farmers enterprise. Computers are mostly used by extension personnel in storing, processing, and retrieving and transfer of relevant agricultural information for official and extension service delivery purposes for farmers. The internet helps in gaining access to the computer by using the search engines to finding quick answers to some knotty issues raised by farmers on their various enterprises by proffering authentic solutions validated by agricultural experts globally (Farmer Led Documentation and Knowledge Sharing, 2010).

Dissemination purpose entails passing useful information to farmers with the use of communication technologies in order to improve the livelihood and standard of living of the rural populace. Relevant information can be disseminated through the following communication tools like radio, television, video, computer, internet, tape recorder, fax, cd- rom, digital camera such that recent or new innovations on farmers enterprises are easily diffused among the farmers community for a greater level of adoption of such technology (USAID, 2010). Through this dissemination purpose, knowledge is gained through the various communication tools which can serve as a medium to train or teach other lead farmers or contact farmers so as to replicate the knowledge or training gained

towards the improvement of their various enterprises like crops, livestock, apiary, fisheries and others for duplication of efforts amidst the farming community as well as communicating with other relevant organisations.

Information gathering purpose encompasses acquiring the necessary information relating to various enterprises for knowledge gaining intent alone through the various communication tools. This could be just to have a knowledge-advantage on vital issues of concern and interests as well as to keep abreast of current trends and information on specific products, innovation or idea. For instance getting to know the current market prices of farm produce so as to have a better bargaining power when purchasing stuffs in the market (Manty, 2011).

2.7 The extent to which ICT tools are deemed relevant by extension practitioners

The extent to which each of the listed tools below are considered as being deemed relevant to extension practitioners in their extension duties depends largely on the use to which each of the tools has been put to in accomplishing or performing a series of extension functions by the extension personnel. Radio, videos and televisions have been known to aid in passing useful farm demonstrations shows by an agricultural expert to farmer or group of farmers in order to train inexperienced farmers on new farming innovations that will improve their productivity. They are also known in linking farmers to markets so as to be versatile in the current price trends of agricultural produce across the globe, nation and rural farming communities and to have a greater advantage of supply power on their farm produce (Cynthia and Nwabugwu, 2016).

Internet, computer, CD-ROM and e-mail also aid in storing agricultural data in form of text, graphic and sound for the benefit of training the farmers on how to improve on new farm technologies that are being communicated to them. This will facilitate their easy comprehension and acquisition of such skills for quick duplication on their farmlands. E-mail plays a vital role in sending messages, links, documents and attachments to farmers, in order to facilitate communication promptly and efficiently for easy application of ideas or innovations they need to be adopt. Mobile phone and intercom aids in raising general awareness of opportunities related to agriculture as well as helps in facilitating access to credits and farm inputs by connecting farmers to

important agencies like the agro-processor in getting these special farm services like farm input supplies, or credit institutions like micro-finance banks for the purpose of securing loans for their farming activities (Olanrewaju, Farinde and Oloyede, 2017).

Literature reviewed according to Khondokar and Debashis, (2015), showed that various communication tools like fax and scanner also aid in assisting with business planning, transferring images from books, photograph into digital formats computer can read for extension delivery purposes to the farmers. These authors also revealed that the projector plays a vital role in providing mass advisories for a training session where a large number of farmers where they are able to learn better approaches to handling challenges they are encountering on their farms through the means of audio-visuals gadgets. The tape recorder has also been useful in creating general awareness of opportunities to farmers by extension practitioners as well as responding to follow-up questions raised by the clients. In summary the following shows how each of this tool portrays great relevance to extension work:

i. Radio: It serves as a viable communication tool for prompt spreading of new and relevant agricultural messages through electrical sound waves to a receiving device. It helps in fostering cohesion among unit system through the diffusion of new agricultural messages that can bring about a revolution to the entire farming community. It has been known to aid in facilitating access to credits and inputs like in the case of governments making it known to farmers through the radio where they can obtain loans (Bank of Agriculture, micro-finance banks) easily as well as accessing farm inputs at affordable prices from agricultural development offices or outlets. It also helps in linking farmers to markets for their agricultural produce so as to identify who to produce for, where to carry the products to for sale and how to package the products in order to attract potential buyers.

ii. Television: This is an essential communication tool that engages both the visual and audio pattern in relaying new agricultural innovations to farmers and thereby enhances their deep comprehension of farm messages by transforming their values, attitude and perception as well as improving their knowledge on agriculture. It assists in providing mass advisories, demonstration shows to large audience simultaneously at the same time. Through this medium, experts can be brought to assist in explaining new

concepts on agricultural innovation to the target audience in order to have a full grasp of the knowledge of what is been impacted to the audience. Also serves as a communication tool that helps in empowering individual farmers through generation of reasonable discussions, also helps in raising general awareness of opportunities related to agriculture.

iii. Video: This communication tool also helps in facilitating tremendous impact during agricultural training sessions for farmers who are ready to receive and adopt better ways to improving their agricultural practices. It particularly aids and support extension work by diagnosing farmers' problems and recommending a solution as appropriate to the farmers' own ecological context. This platform provides an avenue for farmers to see how recent technological advancements in agriculture has been suitable and adaptable to other farmers that have the same farm problem and ecological adaptation dilemma similar to the target audience through real life scenarios. Trainings on relevant topics that can be used during the sessions vary from food and nutrition, pig parturition, livestock management, cropping techniques, fish production and related activities of women in agriculture such as home management, processing, food hygiene and family nutrition.

iv. Mobile Phone: This communication tool has proven to be a veritable tool over time and the efficiency of using mobile phone has contributed to prompt and efficient extension service delivery. The significance of mobile phone in agriculture ranges from sourcing information on relevant technologies relating to various agricultural enterprises such as livestock production, crop production, crop processing, marketing of farm produce, input procurement, facilitating credit and loan facilities (Aker, 2008 and Okello, 2011). All the required information can be accessed on the mobile phone by putting direct calls to extension personnel or sending of text messages to seek and obtain prompt feedback from extension organisations and personnel involved in each of the enterprise relevant to the farmers need. A vivid example is the e-wallet system subscribed by the Agricultural Transformation Agenda (ATA), where agricultural inputs like fertilisers, seeds and cassava cuttings were allocated to farmers by sending text messages to them. Moreover mobile phones aids in gaining access to marketing outlets, obtaining prompt assistance from extension personnel either through emergency calls or text messages. It helps in securing professional consultations from government and

intergovernmental agencies, research institutes, agro-dealers, extension practitioners and financial institutions (Jaji, Abanigbe and Abass, 2017).

v. Internet: The internet is a network that links all computer networks world-wide by telephone or satellite through various service networks connecting diverse users across the globe together. It is widely known for its speedy penetration and connectivity to a body of ideas and knowledge for optimum utilisation of information through servers set up for intercommunication world-wide. It poses to be the most lucrative medium for information exchange across the globe through which the following features are promptly exhibited through it all over the world such as social networking, instant messaging, data transfer, web enabled audio/video conferencing, e mail, online shopping and other financial transactions (Vignare, 2013). It provides better flexibility in terms of interaction through the various types of media like radio, mobile phones and computers. It is considered to be the keystone in communication due to its high rate of connectivity and penetration in linking people that are knowledgeable on various subject matter of interest to the people who are less informed in order to empower those that falls into the latter category (MEAS, 2013).

vi. Computer: Basic definition of computer according to Encarta dictionary states that it is an electronic device that is used to accept, store, process and outputs data at high speed as a result of programmed instructions built up inside the device. It can also be used in retrieval of information stored inside for diverse purposes like official, record keeping, vertical and horizontal communication within an organisation as well as linkage with external context. Its component parts include display screen, small speakers, a keyboard, hard disk drive, touch pad, a processor, a memory, soft-wares like windows, a rechargeable battery, internal storage, removable media drive, central processing unit, input/output ports among others. Computer can be used for word processing, graphic processing and image processing (Wikipedia, 2019). Latest forms of computers have emerged in the forms of laptops, notebooks and tablets. This is as a result of their physical portability which makes it to be frequently used and moved easily from one place to another to enhance productivity at the workplace, home, school, church and everywhere one desires to be.

vii. Tape recorder: This is a sound recording gadget that is used to reproduce, record and play back audio sound by using reel to reel tapes. It was invented in 1878 by an American engineer named Oberlin Smith (Karl, 2006). There are diverse forms of tape recorders ranging from small handy portable device to big multi-track device. It comes with an in-built speaker and can also allow attachment of external speaker to amplify the sound system. It can easily record messages for use by pressing the play button and record button simultaneously. The efficiency of having a well recorded message does involve noise reduction by fine tuning the volume moderately. It can be powered using alternate current, batteries and solar energy at any point in time.

viii. Camera: This is a device for capturing still images as well as moving images which can be stored on a sensitized film. It is characterised on image files when still images are stored in digital form and also characterised on video files when moving images are stored in digital form. The components of a camera are lens, shutter, exposure control, image sensor, focal length, etc. The lens of a camera captures the light from the image and brings into a focus on the sensor. The size of the small opening on the camera and the brightness of the image background influence the amount of light that enters the camera at a time and the shutter control the speed at which the light hits the recording surface. The shutter is also known as the light meter, flash or lens that aids in focusing well on the set image. In order to make an object to be captured bigger, the photographer is required to 'zoom in' on the image and to make the object to be captured smaller the photographer is required to 'zoom out'. The image quality of a camera is measured in Pixel.

ix. CD Rom: This is part of a computer that is used to hold both computer data and audio with the latter capable of being played on a CD player, while data (such as software) is only usable on a computer. A CD ROM is also known as compact disc read-only memory and it is designed to store computer data in the form of text and graphics and hi-fi stereo sound. The CD-ROM data storage is organised into two phases. The CD ROM 1 helps in storing data in sectors and arranged as it holds on audio disks, while the CD ROM 2 helps in compressing audio/ video information. CDs have been consistently being replaced by other forms of digital storage such as flash drive, diskette and memory card. They are prone to damage while handling them and from environmental exposure.

Sharp objects easily damages it especially on the label side of the disc whereas scratches made on the clear side can be easily repaired by careful polishing. It comes in various sizes and formats such as audio CD, super Audio CD, CD-ROM, Video CD, Photo CD, rewritable CD and Super Video Compact Disc/DVD.

x. Intercom: This is an intercommunication gadget used within a building by functioning independently of other public telephone network. It is mostly used nowadays in many schools, financial organisations, governmental organisations and intergovernmental organisations. It can also be used in vehicles, aircraft, trains and water crafts. It can be mounted against the office walls or buildings as well on plane platforms. There are two forms of intercom which are the analogue intercom and portable intercom; these are usually powered centrally wherever they are installed. They facilitate ease of communication by subordinate to superior staff within an organisation as it enhances direct communication within an intra-organisation platform.

xi. Projectors: This is an optical device that projects an image onto a projection screen or a smooth surface. An image is created by shining a light through a small visible lens or lasers. Various types of projectors include video projector, slide projector and overhead projectors. Video projectors can be used for still images through power point presentations with direct connection to a video. Projectors generally can be used to magnify slide shows, infographics and video. The HDMI and AV cables are used in connecting a projector to a source for optimal functionality.

xii. E-mail: The electronic mail is a platform of exchanging messages known as mails between two or more persons using an electronic gadget. The internet e-mail consists of an envelope and content ([ietf.org/html/rfc5321\section](http://ietf.org/html/rfc5321#section)), the content also consists of a header and a body ([ietf.org/html/rfc5321\section](http://ietf.org/html/rfc5321#section)). The e-mail exhibits some features which have to be filled before the sender can conveniently send it to the receiver. These include: To (this indicates the email address of the primary recipients, while Cc (secondary recipients that you want to the primary recipient to see is receiving the same message), while Bcc (multiple or other recipients which the primary recipient is not privileged to see receiving the same message). Also it has the 'Subject box' which indicates a brief title of the message being sent. This is followed by the message body which consist of the message content to be relayed to the recipients.

xiii. Fax machine: This is the telephonic transmission of scanned printed materials (both text and images), to a telephone number connected to a printer or other output device. The main document is scanned with the fax machine, processes it and converts it into a transmittable form through the telephone system into audio-frequency tones to the receiving fax machine. The receiving fax machine interprets the tones and reconstructs the image by printing a paper copy (Rouse, 2006). The fax machine is no longer in use like before but it has been substituted of recent with internet fax using an e mail account and can be received as attached PDF files by the recipients.

xiv. Scanner: This is a device that visually scans images, pictures, documents, charts, handwriting or an object by converting it to a digital image. It is mostly used in various organisations and acts as an input device of a computer system. Scanners exist in various forms as hand held scanners and 3Dscanners used for industrial designs.

2.8: Extension delivery strategies of extension practitioners

Most strategies employed by the extension practitioners from the various organisations centres around farmers' adoption, awareness of and access to practices, technologies and markets of new technologies in agriculture as well as gaining access to farm inputs and services. These strategies include Farmer Field Schools, Demonstration plots and Individual follow up, Lead farmers and specialised training, credit schemes and saving initiative, value chain and market integration, on-farm trials, field days, group extension methodologies, on research station workshop, training and visit (Sahlaney, Hoerberling, Bell and Bohn, 2015) .

a. Farmer field schools, demonstration plots and individual follow up – Farmers Field School serves as a training technique that agricultural extension organisations use to involve farming communities or farmers on current farm technologies, agronomic practices coupled with interactive discussions of farmers personal needs, available resources, challenges as well as basis for adoption or non-adoption of the technology. This creates a participatory situation with a trained facilitator who has acquired well known and sharp skills from the extension personnel; this is usually represented by a farmers' representative. Demonstration plots are purposively included as part of a Farmers' Field School or is singularly in operation to prove the

effect and advantage of embracing new farm inputs, innovation by farmers on an interpersonal basis. Farmers are allowed to be involved directly in the set-up and management of the demonstration plots in order to equip them on the various trainings received in the Farmers Field School. Individual follow-up is basically carried out by extension practitioners or agriculture-based organisations by encouraging inter-visits among farmers as well as between farmers and buyers with the aim of showing essential agronomic practices, technologies and also up-grading dynamic relationships between farmers and buyers. The follow-up context has been integrated in order to have a clearer understanding (in-depth) of farmers' needs and problems.

b. Lead farmers and specialised training – Lead farmers are mostly identified by agricultural extension organisations as farmers who are prompt in embracing farm innovations and ideas easily by extension personnel. They are known to be hyper-active and having a higher enthusiasm in any agricultural-related programme. They require little or no effort in convincing to adopting a new idea, as well as becoming a model to other farmers in the farming community. Most organisations make use of lead farmers so as to enhance local participation coupled with developing local leader capacity in order to increase their target beneficiary support. Some organisations usually create an extensive approach in developing lead farmers by locating the vacuum created in input supply on their farms, as well as weak relationships in the operation of their local markets. These lead farmers helps in cushioning these loopholes existing between farmers and input suppliers.

c. Credit schemes and saving initiatives- This strategy encompasses linking of farmers to credit facilities, financial management skills which is required in all Extension Advisory Services (EAS). Credit facilities are aimed at increasing farmers' access to farm inputs and services. These credit schemes are oftentimes inter-linked with low –interest paying rate financial institutions like micro-finance banks and other commercial banks and non- governmental organisations where farmers are assisted in securing loans in expanding their farming business. Agricultural extension based organisations incorporate savings culture into the programmes being communicated to rural farmers so as to enhance their financial management capacity. A practical example can be seen from the Catholic Relief Services (CRS), which encourages savings by linking people, viable

existing farmers groups, farmers' associations to draw their resources together and lend money to other active members of the farmers group or associations.

d. Value chain and market integration and development- Agricultural-based organisations mostly prefer integrating farmers into existing markets and value chains by encouraging consistent consolidation in the marketing of agricultural produce and value additions. This can be attained by ensuring input facilitation with access to market, program sustainability and improving the farmers' behavioural change through value additions to the farmers produce. This assists Farmers Based Organisations (FBOs) to possess a more bargaining power in the process of buying and selling as it helps in eliminating uncertainties and risks in such transactions of their farm produce with consumers and hence reliable trust is ensured in the process.

e. On-farm trials-It deals with working on the farmers' farm for direct observation and first hand learning on-experience or on a small plot experimental basis close to the farmers' farm. It is aimed at showing farmers a practical how to do-it approach on the various innovations relating to their farming by trained extension personnel. The raw experience garnered can later be used for later adoption on farmers own plot.

f. Field days- This strategy exposes farmers from a particular community to bring in all their special farm produce at the end of a planting season for farm exhibitions where agricultural experts, as well as agricultural based organisations and other farmers are encouraged to be a participant and observe the impact or outcome of the innovations adopted on their farms through the display of farm produce harvested at the end of planting season.

g. Group extension methodologies- this is a strategy that embraces assembling farmers together as a group in order to impart the necessary skills, knowledge and improve their behaviour towards accepting relevant and up to date technologies on agricultural farming through the various audio-visual aids like projectors, slides, flip charts etc. There are various ways through which group extension methodologies can be carried out; these include method demonstration, result demonstrations, field days, excursions, lectures, panel, conferences and workshops.

h. On-station research workshop- These are majorly situated in research institutes where various agricultural technologies are initiated or carried out by scientists, subject matter specialists and renowned experts in the field of agricultural sciences before they can be transferred to the farmers' plot on experimental basis. The technologies must have been subjected to suit the research ecological environment and climatic conditions and proven to be technologically adaptable before it can be guaranteed for further transmission to the farmers' ecological environment.

i. Training and Visit- The training and visit system is a concept that was developed by a World Bank expert named Daniel Benor in 1974, for the purpose of actualising an effective agricultural extension service that is research-based and tailored to satisfy farmers' needs. It primarily aims in rendering appropriate advice that would assist farmers in increasing their farm output and consequently their income through a touch of professionalism from the extension services rendered. The extension service is structured to operate a single line of command via the Department of Agriculture, with other subsidiary support from other agricultural organisations as well as local governments' organisation alongside with the administrative commitment of extension agents operating with their technical advice from each of the unit they are representing in their departments (Ogebe and Adanu, 2018). The Training and Visit system also exhibit concentration of effort by singularly focusing on extension work and ensuring consistent progress by regularly monitoring and evaluating the impact of its extension services to the target beneficiaries. It also manifest with time-bound activities such that the necessary knowledge and skills given to farmers should be consistent within the time frame of the fortnight visit to farmers by the extension workers. Other features the Training and Visit exhibit are field and farmer orientation, regular and continuous training, linkage with research by taking farmers feedback which are the problems encountered and unresolved back to research for immediate solution and viable outcomes.

2.9 Various perceptions of extension practitioners about the use of information and communication technologies in their extension activities

Extension practitioners' perception on information and communication technologies use ranges from favourable disposition to unfavourable disposition as the

case warrants. Practical examples from literature reviewed distinctively authenticate Yekinni's finding that majority of researchers had favourable disposition to communication technology use while extension personnel had unfavourable disposition to communication technology use. This basically boils down to their limited knowledge of the technologies and inconsistent utilisation of the communication technologies in their dissemination activities (Yekinni and Akinbile, 2014 and Sampath-Kumar and Kumar, 2010). Some extension officers have a perception that the quantity of agricultural messages that can be passed to farmers through the use of communication tools could be very limited (Sanjay, 2011). This perception arose based on the diverse farmers' dialect that may not be easily interpreted on communication tools for farmers use by the extension personnel. Most extension practitioners' perception on utilisation of communication technologies also showed that extension delivery can be enhanced through the use of communication technologies as it helps in raising the general awareness of opportunities available to farmers (Enwelu, Enwereuzor, Asadu, Nwalieji and Ugwuoke, 2017).

This perception of helping farmers to be aware of latest technologies and opportunities has been greatly influenced by easy access to communication tools like mobile phones, radio, television, internet, computer and audio recorder by extension personnel used in communicating to their target beneficiaries. Few extension practitioners also had favourable perception on communication tools being able to aid in breaking gender restriction in receiving agricultural messages (Agwu and Ogbonah, 2014). In India for instance, women have been enabled to receive instant SMS messages on their mobile phones about current prices of their farm produce, when and where to get their farm produce sold (Global Service for Mobile Agriculture, 2010). Likewise in Kenya, 43 percent of farmers who were enabled to put a call to Farmer helpline mainly known as M-kilimo were mostly women who were adequately assisted by female extension personnel on getting up to date information on various farming operations accessible to them. The information was packaged into various dialects that would be suitable to addressing the beneficiaries' needs and problems in their native languages (Global Service for Mobile Agriculture, 2010). Majority of female extension practitioners in The Women in Agriculture (WIA) Department in Agricultural Development

Programme in the North central zone of Nigeria were able to also use few communication tools in creating awareness and advising their target beneficiaries mostly women on fruit and food processing procedures, as well as booking appointments on when to meet with them during their women association meetings through the use of mobile phone (Agwu *et al*, 2014).

2.10 Constraints that limits extension practitioners' access and use of information and communication technologies in their extension work.

Some of the problems that tends to limit extension practitioners' access to ICTs according to Omotesho, Ogunlade and Muhammad (2012) revealed that non-affordability of communication tools and equipment, high cost rate of internet facilities were considered to be major challenges faced by extension officers and their Subject Matter Specialists in Kwara state. In addition, other limitations contributing to extension workers' access to information and communication technologies include low financial remuneration which originated from governments' inconsistency in meeting the extension workers financial obligations; poor technical know-how of extension agents, lack of adequate exposure to internal and external training, as well as remote location of information and communication facilities for extension agents' use. These constraints pose serious threat to extension practitioners' gaining of access to information and communication technologies in their disseminating activities.

Similarly, other challenges that limit extension practitioners' use of information and communication technologies are poor infrastructural set-up which is as a result of inadequate investments by extension organisational management (Arokoyo, 2003). Also limited man-power is another challenge to optimum use of communication technology majorly caused by inherent need in capacity building and recruitment of experienced hands in the extension work. Others include low level of computer education among extension workers, having difficulty in integrating with existing media as a result of poor communication policy and inconsistency in governments' policy in the agricultural and telecommunication segments has hindered effective utilisation of information and communication technology by extension personnel in their dissemination activities

(Yakubu, Abubakar, Atala, Muhammed and Abdullahi, 2013). These constraints can be summarized further as

- **Low number or ratio of extension practitioners to farmers:** This factor contributes as the major limitation to the dissemination of useful agricultural-related innovation to farmers especially, thereby leading to a minimal number of extension personnel that can be enhanced to operate the use of information communication tools in relaying necessary innovations to farmers.
- **Low level of knowledge on communication tools in relation to agricultural information:** This also affects the functional capacity of extension practitioners in handling the available communication tools effectively during dissemination of agricultural information in extension trainings or seminars. This becomes more pronounced when the institution has a low capacity in empowering the staff to utilising communication tools in facilitating their extension duties.
- **Inadequate funding:** The inability of government to fully support and fund the advancement of extension services in Nigeria through the public sector has generally weaken the extension service delivery system. Instead, irrelevant spending by the government on events that are deemed unimportant has brought about a drawback in the viability of extension service delivery in the country (Imhonopi and Urim, 2011). This can be further corroborated with the insignificant and detailed annual budget allocation to agricultural sector in the country by the federal government for the years 2011to 2015 as shown in Table 1below.
- **Lack of relevant infrastructures:** This problem is as a result of poor investment set-up at the public, private, international and non-governmental organisations by the various extension managements at diverse levels (Arokoyo, 2003). These infrastructures when deficient at the various organisations will alter the rate at which agricultural information can be conveyed and communicated with ease to the recipients.
- **Epileptic supply of electricity:** Most communication tools draw their source of power from direct supply of electricity and extension practitioners from the public sector usually suffers most from this plague. This is as a result of over-

dependence of power supply from the government as well as low financial capacity to source for alternate back-ups for progressive and dynamic extension delivery.

Table1: The wane in national *allocation* to the agricultural sector in Nigeria

Year	National (Trillion) Naira	Budget	Agriculture (Billion) Naira	Percentage (%)
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2011	4.07	81.2	1.81
2012	4.69	78.9	1.66
2013	4.92	81.4	1.77
2014	4.6	66.6	1.47
2015	4.36	39.15	0.9
2016	6.08	29.75	0.01

Source: Vintagesam (2016)

2.11 Extension service delivery organisations in southwestern Nigeria

2.11.1 Private Organisation –British American Tobacco (BAT), Nigeria

British American Tobacco has been in existence for over a century with their major interest being agricultural-oriented in tobacco production. They established their agricultural extension arm successfully in Nigeria since 2003. They majorly encourage their farmers in tobacco production as well as facilitate other rural agricultural development activities. In addition a mutual and sustained relationship is enhanced between their clientele and extension service providers in order to have a deeper insight into challenges farmers are facing in their agricultural production (BAT Strategic Report, 2015). The extension approach concentrates mainly on four different areas which are:

- Defining: This entails projecting technologies which are appropriate in ameliorating the challenges being faced by their clientele on the farm.
- Discovering: This aims at discovering latest research needs that can bring remedy to farmers' challenges as well as providing methods of adoption from similar crops.
- Developing: This entails improving and advancing scientific research and bringing them to farmers to see the new practices on small plot demonstrations.
- Deploying: This involves the distribution of latest agricultural technologies to farmers in ways that are comprehensible within a locally relevant-context. This extension focus is carried out in a well-integrated manner by their field technicians and extension personnel who also supports farmers' livelihood through technical assistance, guidance and arranging trainings on their various farm enterprises. It has been reviewed from literatures that their tobacco production has risen from 2,088 to more than 2,500 tonnes within 2004 to 2013. (BAT Report, 2016). Production of other food crops like cassava, sweet potato, beans, sorghum, maize and other cereals have also being greatly encouraged by their farmers in order to sustain their livelihood activities. Farm inputs like fertilizers, pesticides, harvesting facilities with minimal or non- interest loan are given on it, certified seeds are provided to encourage the production of these crops by farmers.

Other programmes that BAT organisation also oversees include banking literacy which involves opening of individual bank account by farmers in order to be able to obtain all the dues accrued to them from the sales realised from their tobacco production (BAT Strategic Report, 2015). Also mechanisation scheme which entails renting of

tractors to farmers who might want to use them in clearing of their land for agricultural purposes. The tenancy period for the rentage of these tractors is within a period of 4 to 5 years, which allows for optimum use of this machinery for their agricultural activities. Afforestation programmes have also come up by promoting and sponsoring the planting of Teak and Gamelina tree plantations especially where their extension arm is operationally based in Iseyin, Oyo State of Nigeria (BAT Report, 2016). The organisation also ensures the provision of these tree seedlings for planting purposes to the national government of Nigeria. The issue of child labour in tobacco growing is also frowned at by the management of the organisation by adhering to all local and international labour regulations that relate to children's safety and well-being. Support services for Savings and Credit Cooperative Organisation (SACCO) to help farmers gain access to credit facilities for their agricultural production (BAT Report, 2016). Moreover crop and health insurance has been facilitated by the organisation in order to make farmers access to using these facilities much easier. The organisation also engage in active dissemination of latest research developments to their clientele through new communication technology platforms like ensuring adequate training of farmers using projectors, radio broadcasts, television broadcasts, communicating relevant information through the mobile phones, internet, email, videos, camera and CD-ROMs (BAT Report, 2016).

2.11.2 Non-Governmental Organisation (Justice Development and Peace Commission)

Justice Development and Peace Commission is a non-governmental organisation and christian based organisation that aims at promoting human right and culture of peace among citizens, ensuring farmers' participation in the development of themselves and communities, integrating the socially marginalised people, establishing viable sociological structures that will enhance the weaker ones on ground, also collaborating with international agencies, governments as well as other NGOs for consolidated development and engaging in researches, documentation and publicising of information on social-related issues. According to JDPC Report, (2015) their extension focus encompasses the following:

- Enhancing farmers' livelihood, income and food security level in their agricultural production: This can be carried out by their extension practitioners visiting the farmers' farm to tackle the challenges facing them in their farm production. In situations where farmers are facing post harvesting losses, their operational capacities can be developed by teaching them to improving their processing and storage systems to enhance better market prices for the sales of these products.

- Group facilitation and resuscitation of farmers: The organisation ensures farmers have viable groups that ensure mutual interaction of agricultural activities embarked upon by members of such groups. This is to enable the extension practitioners' easy reach to addressing the farmers' challenges on their various enterprises. It also ensures that group trainings are carried out to build the capacity of farmers in such groups on how to improve their level of productivity on their various enterprises.

-Improving involvement of youth in agriculture: Youth involvement in agriculture is greatly encouraged by consistent follow-up of young farmers involved in various agricultural enterprises. The extension practitioners of this organisation oversee and direct them on how to improve their farming skills in their various enterprises. Apart from the follow-up, regular trainings on various enterprises such as cultivation of improved cassava varieties, new poultry and brooding management practices are being given to the young farmers. The young farmers are literarily exposed to time to time excursions that relates to their various enterprises, and as such this provides a greater level of exposure to gaining new insight to improving on their current level of agricultural production or enterprise.

- Dissemination of agricultural messages through media platforms: relevant agricultural messages are aired on radio programmes for rural farmers in their local dialect so that they can benefit from new agricultural innovations related to their farming enterprises. Also relevant agricultural innovations or news are printed in handouts for literate farmers. For non-literate farmers relevant messages with vivid pictures are shown on posters which are pasted in strategic places to be viewed by these farmers. The use of new communication technologies such as mobile phones, e mail, internet, videos, projectors, CD-ROM, cameras, etc. are also used to sensitise farmers on recent agricultural

developments as well as keep farmers abreast of current market prices, which gives the farmers an hedge of where they can market their farm produce for prompt sales of their agricultural produce.

2.11.3 Intergovernmental Organisation-United State Agency for International Development (USAID)

United State Agency for International Development stands as an intergovernmental organisation in developing countries for varying purposes in order to provide poverty reliefs, health-reliefs as well as disaster-reliefs to citizens of such countries. USAID as an intergovernmental organisation in Nigeria has series of programmes being implemented at different periods or times it has targeted to achieve the goals of such programmes. For instance there has been execution of USAID programmes like USAID-Markets 1, Markets 2 and Markets 3 (DLEC, 2017). Each of these phases is channeled to specific value chains of various agricultural commodities such as cassava, soybean, maize, cocoa, sorghum, rice and aquaculture. It also encompasses providing adequate training to extension personnel on various aspects of agriculture like group dynamics, group formations, post-harvest management, seminars on pre-season trainings and leadership skills. A sumptuous amount of money of about US \$ 64 million was budgeted for about 25 developing countries to be managed appropriately towards these value chains of agricultural commodities. Other USAID programme include USAID Feed the Future Nigeria Agro-Inputs Project (AIP), which has a mandate of assisting farmers in getting affordable and quality agricultural inputs (DLEC, 2017). This was achieved by leading a private sector agricultural input market which was successfully accomplished by the end of 2017.

The project assisted in ensuring provision of agricultural technologies which can boost farm productivity, free supply of other farm inputs like seeds, fertilizers, farm tools, agrochemicals. Moreover training was given to about 2,000 agro dealers who can assist farmers and extension agents in applying these technologies on their farms for optimum productivity (DLEC, 2017). Government agencies, NGOs and other private extension organisations are platforms that USAID usually uses in implementing their latest market development programs to the rural farmers through the already established extension structures of

these various extension organisations, as well as using their extension personnel. An example of USAID's new approach was the Farming Systems approach to research and extension.

According to USAID (2016) annual report, USAID initially improved its approach towards agricultural extension delivery since 1985, which embraces strengthening public extension services, by linking research and extension; linking the private sector to public extension systems; using Private Volunteer Organisations (PVOs) as implementing agencies. The organization also ensures continuous support for the farming systems approach by optimizing the use of radio, media platforms as well as motivating other private extension services. Impact of extension efforts supported by USAID can be felt by total compliance of rural group farmers towards the change being advocated for through current management practices, wise use of natural resources at their disposal, new planting technologies, institutional and organizational planning. USAID realized that working through Private Volunteer Organisation and Non-Governmental Organisations by provision of recent advancement in production technologies will enhance the agricultural activities of poor resource farmers that these extension organisations do reach out to. USAID major aim was to transfer recent technology to farmers in developing countries such that harmonizes with their local agro-ecological conditions. Literature reviewed from USAID (2016) revealed that this approach was a prototype of that of American Land grants University teaching-research –extension system, which resulted in an outstanding feat. USAID was largely known to assisting in establishing extension systems throughout Asia, Latin American and Africa. In addition, countries where USAID relevance has been felt most include Taiwan with regards to their rice production revolution, also Agricultural University in Peshawar Pakistan where research results were appropriately factored to suit the farmers need. The capacity of Egerton University in Kenya was expanded by USAID to upgrade their extension through field technicians that provides the necessary skills, training and knowledge to farmers' problems on a continuous basis. Other countries USAID works with by partnering with two other organisations apart from Nigeria as regards genetic improvement along with production of cocoa varieties which are being grown on the farm are Ghana, Ivory Coast and Cameroon.

This is to ensure that cocoa farmers are well educated and exposed to adequate trainings on cocoa production. Generally, USAID support covers a range of agricultural activities such as use of modern fertilizers, animal traction, introducing of new varieties of crops, poultry production on a commercial scale and recent agricultural techniques. It is important to note that not all USAID extension efforts recorded a great success. Limitations were also encountered by USAID organisation, partly because the technology could not take care of the number of farmers on ground and was viewing the extension intervention from the U.S extension approach. Also, it was using the general extension system of administration in passing information to farmers without considering the applicability of such practices to the farmers' ecological context. On the other hand, the country extension systems had their own limiting factors towards the success of extension, such as inadequate funding, poor linkage with universities, researchers, private agribusiness firms, not utilising local participation as expected, etc. The extension agent to farmers' number was insufficient with a disproportionate ratio as there were few extension hands to cater for the large number of farmers which made the USAID organization in having management issues and other financial implications in the course of rendering their extension services (USAID, 2016).

Over time, one of the ways USAID used to adjust itself to these challenges was by realigning its initiatives to achieve better results. For example, USAID-supported programs began engaging local farmer groups to participate in the design, testing and dissemination of new agricultural technologies. It has also increasingly worked to decentralize agricultural extension and information services, using mass media and information communications technologies in extension in reaching out to clientele (USAID, 2016).

Literature reviewed from USAID 2016 revealed that Farmer-to-Farmer program was one of the age long and common strategies deployed by USAID organization in educating and training their clientele. Transfer of knowledge and technical expertise was being carried out by United States agricultural producers and entrepreneurs through the farmer to farmer program on a charitable platform. The program was introduced in 1985 and has been reckoned as one of the best program used, due to its top-quality technical services it offers. Their workers who offered to render service to farmers without

expecting a dime in return usually go through rural cooperatives as well as producer organisations based on their specialty in providing solutions to farmers problems. According to USAID Report (2016), Areas of services rendered in agriculture encompass livestock, processing and marketing, income diversification, linking with producer organisations, management of natural resource and financial support services. Major focus areas include horticulture and high value crops, income diversification, dairy and livestock, producer organizations, financial services, marketing and processing, and natural resources management (USAID, 2016). Farmer-to-Farmer program used by USAID organisation majorly focuses on economic impact of their services to clientele through deployment of their workers to various commodity programs, service sectors and main geographical areas (USAID, 2016).

2.11.4: The Public Extension Organisation-Agricultural Development Programme (ADPs)

The ADPs is a state-level programme through which most public extension agents are employed in the country. The ADP offices were established in the 1990s and were receiving full sponsorship from the World Bank. Extension agents to farmers' ratio ranged between 1:1,000 to 1,500 during the period the World Bank was funding the ADPs (FMARD, 2012). The withdrawal of funding by the World Bank led to recruitment and secondment of permanent and contract staff respectively. This inadvertently led to gradual reduction of the workforce in the state-level programme when retirement or resignation occurs without prompt replacement thereby resulting into poor quality of extension services rendered (CTA, 2011). Currently, funding of extension is being mainly carried out by the federal government, while execution of the services is attended to by the state government.

It has been on record that only Kaduna and Anambra states were the two states that are fully sponsoring their ADP programme out of the remaining states in the country, the remaining states depends on donor projects (FMARD, 2012). The role of local governments in extension service delivery has not been fully specified as a result of undefined government policies regarding their roles. Also, the private extension sector has not been intimated with specific roles by the federal government, but most private

organisations that are commodity-specific have plunged themselves into extension service delivery to make up for the government extension. However, the involvement of the private extension sector can be improved upon if the government ensures stable and consistent policies. (Federal Ministry of Agriculture and Rural Development, 2012).

For many years now, after the withdrawal of the World bank funding of the ADPs, most have not had adequate exposure to external training for their field staff, as well as non-recruitment of new staff for over three decades. As a result of this, the state governments have concentrated on ensuring that staff have enough funds for their monthly wages while other allocation for staff up to date training on extension delivery and field expenses for staff had suffered adversely with little or no motivation to the staff. The ADPs in each state has been structured into zones, subzones, blocks which also represent local government area and cells which also represents group of villages where the farmers reside. Initially, the funding of the ADPs was designed to be done with the consent of three funding source that is, World Bank, Federal government and State government with a contributive ratio of sixty-six percent, twenty percent and fourteen percent respectively. With the foregoing, the ADPs were expected to work in unison with the agricultural department of the Local Government Areas in order to be able to reach the grassroots farmers effectively (Auta and Dafwang, 2010).

Most extension personnel educational qualification requires they pass through different educational levels in order to acquire the necessary training and knowledge on agricultural extension. These are Ordinary National Diploma (OND) within a period of two years, followed by Higher National Diploma (HND) also within a period of two years. The Bachelor of Science (BSc) degree comes after within a period of five years. The next phase is the Master of Science (MSc) within a period of eighteen years and finally a Postgraduate Higher Degree (PhD) which ranged within a period of three to five years depending on the type of institution being attended. Literatures reviewed revealed that majority of extension agents from northern states mostly possess Ordinary National Diploma (OND), while those from southern states mostly possess Higher National Diploma (Benjamin, Onu, Jungur, Ndaghu and Giroh, 2016). Most extension personnel from ADPs are faced with returning for their higher education from BSc to MSc and even to PhD as a result of the non-buoyant state of ADPs. The Sasakawa Africa Fund for

Extension Education (SAFE) was initiated in 2003 with the aim of empowering extension personnel in their mid-career to acquire tertiary degrees (SAFE, 2017).

The back-up plan to alleviating the attrition experienced in ADPs include the introduction of N-Power Programme which aims at hiring 500,000 youths that ranged between the ages of 18 to 35 by focusing on extension service delivery of various department such as education, health and agriculture (DLEC, 2017). This strategy was also introduced by the federal government to enhance employment opportunities among the youth as well as foster peace among the citizens of Nigeria about the issue of high rate of unemployment. The newly employed youths who are also referred to as paid volunteers by the program are started on a fixed stipend of #33,000 which is equal to \$100 per month with adequate exposure to rudimentary training and step by step guide on extension service delivery for two years (FGN, 2016). The ADP would like to hire good performers upon conclusion of the two-year program, but that will depend on an improvement in the economy and state government revenues. For each of the ADP state, a focal officer has been designated to oversee and manage the activities of the volunteers from the federal level, though the volunteers are stationed with the ADP offices to work with them. Part of the challenges being faced in overseeing the activities of these volunteers includes performance on the job and plan of work due to the large number of volunteers to supervise. Previous experience from financial expenditures of staff employed in extension service delivery, showed that monthly salary payment is not sufficient to sustain the drive of extension personnel on the field; but much more field expenses, improved education and steady linkage with the Agricultural Knowledge and Information System (AKIS) should be taken into better consideration for lasting impact. Mostly it has been observed that the state government has been in charge of funding the salaries of ADP extension personnel, without any consideration for travel allowances, communication allowance and training or field work expenses (CTA, 2011). Extension personnel working under the public agricultural agency like ADPs should be upgraded with information-related issues as regards gender and youths involvement in farming adequately.

Moreover, they should be equipped with sufficient knowledge on use of communication technologies, so as to enhance their disseminating activities as well as

increase their efficiency in getting relevant feedback from their clientele. This will make them more relevant in the Agricultural Knowledge and Information System as there will be continual flow of relevant information within and without for optimum extension delivery towards their clientele. Some of the communication tools that the extension personnel uses in their delivery activities include smart phones, radio, digital camera, tape recorder and projectors.

As revealed by the findings of DLEC (2017), Kaduna State Agricultural Development Programme is well known for its outstanding feat in extension service delivery due to the radical nature of the average farmer in the state. The average farmer is very dynamic and enterprising than other farmers from the northern states as they engage in dairy farming and are known for their huge grain production in the country. As a result of this, they tend to enjoy extensive support from the state government as farming is known to be their major source of income. Kaduna has been a center for agricultural extension since before Nigeria's independence. The Institute for Agriculture Research was established near there in 1925. The Kaduna ADP collaborates with a variety of donor projects, including Markets II, AGRA, African Agricultural Technology Foundation (AATF), GIZ/GreenInnovation Centers and Sasakawa.

Irrespective of the numerous advantages exhibited by Kaduna ADPs over others, they still face some challenges of providing basic field work packages for their extension workers. For instance, the extension agent to farmers' ratio is 1:4,700 farm families presently. Other limitations experienced include lack of fuel allowance for the motorcycles sponsored by donors, inadequate training period for field staff and minimum exposure to field demonstration.

The extension agents overall package for effective job performance was reviewed in a meeting with extension personnel at Kaduna in January, 2017 and include the following areas for improvement in their extension delivery services:

- Provision of funds for travelling expenses of extension agents.
- Farmers to have better access to farm inputs, such as seeds and fertilizers
- Government programs should be on a continuous basis.
- There should be ways to enlarge the extension agents' work force through mass recruitment into the organisation.

- Funds released by the government for extension field work should not be diverted to other official activities.
- Effective communication should ensue between extension workers and farmers about governments' commitment to support farmers at appropriate seasons so as to secure farmers trust.
- Donor projects should be projected with the aim of being sustainably managed after intervention to the target recipients.
- Feedback from farmers to be well incorporated into extension agents programs.

2.12 Methodological, analytical and empirical review of other related studies

Related studies reviewed include use of ICTs among private agricultural organisations workers in Nigeria (Oladeji an Oyesola, 2011). The study was carried out in Oyo state. Simple random sampling was used in selecting 105 skilled workers from the registered private agricultural organisations. The study utilised primary data and collection of data was obtained through questionnaire. Descriptive and inferential statistics used were frequency counts, means, percentages, chi-square, Analysis of Variance and Pearson Product Moment Correlation. Results showed that 76.2% were male and 23.8% were females. Also, 80.9% of extension workers fell within the age range of 26-40 years while 8.6% fell within 41-51 years. It also revealed that 52% were single while 47.6% were married. Respondents with highest educational qualification were mostly distributed along BSc (53%) while 26.7% had HND. Respondents' highest years of professional experience was 47%, while 25.7% had 7 or more years. Majority of the skilled workers (59.1%) had favorable attitude on ICT use and 55.2% of the respondents also benefited from the use of ICTs. Analytical results showed that sex, marital status, educational level, years of professional experience were not significantly related to ICT use. Though age was significant using Pearson Product Moment Correlation ($p= 0.000$). Use of ICTs across the agricultural organisations was also significant using analysis of variance in testing between and within organisations ($F= 0.013$). The major constraint encountered by extension workers was unstable power supply (15.91) followed by high cost of new ICTs (13.74). The gap this study was unable to cover reflected mainly on considering private extension workers. My current study was

able to go further by not just considering private extension workers but by investigating on public extension practitioners from public organisations along with those from non-public organisations (intergovernmental, private profit-oriented and private non-profit extension practitioners). This has really helped in ascertaining the varied extent of utilisation of ICTs among the extension practitioners for timely intervention of distinct stakeholders at various levels.

Furthermore, another study by Nyarko and Kozari (2021) on use of ICTs among agricultural extension workers in Ghana has been reviewed. The study was carried out in the four regions of Ghana. Primary data was used in eliciting data from the respondents through the use of questionnaires. Simple Random Sampling was used in selecting 165 field practitioners who were mainly working with government parastatal. Descriptive and Inferential statistics used were percentages, means, frequency counts and chi-square. Results showed that 80% of the extension workers were males and 19.6% were females, majority of the extension workers fell within the age group of 31-40 years, highest educational qualification level obtained by respondents was Diploma (42.5%). Also, results revealed that respondents used ICT tools most between 7-14 hours weekly. Sources of training the respondents were mostly exposed to, had mainly been from “part of the university training” received on ICT (37.9%). It was found out that 90.2% of extension workers have not been exposed to any ICT training within their organization since the last three years in their organization. Factor influencing ICT usage among extension workers mostly was poor network connection (4.35 ± 0.79), followed by inadequate training opportunities (4.12 ± 0.89). The study concluded that the use of ICT was higher among the extension workers in gathering information for themselves but not suitable to their target beneficiaries for dissemination of agricultural messages. The gap this study has not covered up was mainly reflected through some of the ICT tools not being selected for the study such as television, radio and compact disc which were more suitable for their clientele. The study focussed more on the use of sophisticated ICT tools (Ipad, Tablet, Twitter, Telegram, Plantix app, Open data kits app, Facebook and others) for the study. My current study was able to address the suitability of ICT tools used by researching on traditional ICT tools along with new ones that are relevant to the extension practitioners and farmers.

A study on challenges to adoption of ICT tools by agricultural extension workers in Nigeria (Cynthia and Nwabugwu, 2016) was also reviewed. This study was carried out in Anambra State. Stratified sampling technique was employed in the selection of 69 extension workers from Agricultural Development Program (ASADEP) in the study area. Quantitative research methods through the use of well-designed questionnaire. Descriptive statistics such as frequency counts, percentages and mean were used. Results showed that 92.8% of extension workers has greatest access to mobile phone followed by computer (52.2%) and radio (50.7%). It was also discovered that 88.4% used mobile phone mostly for their extension work, followed by T.V (42.0%) and radio (36.2%). Selected attitudinal statements revealed that 94.2% were positively disposed in their attitude in using ICTs to improve linkage between research and extension while on the other hand (97.1%) of the respondents were negatively disposed to using internet due to the tendency of falling into the hands of online scammers. Major constraints faced by extension workers were interrupted power supply (\bar{x} =1.68), followed by high cost of ICT tools (\bar{x} =1.57); while the least constraint is limited internet coverage (\bar{x} =1.12). A major conclusion of the study showed that most of the extension workers indicated not using other vital ICTs in their extension work such as video (76.6%), camera (72.5%), audio-recorder (82.6%) and audio-visual aid (78.3%). The results showed that there was a low adoption rate of ICT tools for extension service in the study area. The gap this study has left was that it was not able to categorically show the level of attitudinal disposition of the respondents to using ICTs and the relationships between selected independent variables and the dependent variable in the study for their extension work. My current study has therefore gone further to provide the levels of perception, relevance, access, and extent of utilisation of ICTs by extension practitioners. My study has carefully revealed the relationships and differences between the independent variables and dependent variable for the study through the use of inferential statistics such as linear regression analysis, analysis of variance and test of difference. These had provided concrete research findings that researchers, governments at local and international frontiers as well as reputable stakeholders in the agricultural knowledge and information system can use for future researches.

Moreover, another study on utilisation of ICTs in agricultural extension services of Bangladesh (Islam, Haque, Afrad, Abdullah and Hoque, 2017) was also reviewed. The study was carried out in five Upazilla under Manikganj district of Bangladesh. Proportionate random sampling technique was used in selecting 110 sub-assistant agricultural officers. Both primary and secondary data were used in the collection of data. Descriptive and inferential statistics used were mean, frequency counts, percentages, chi-square and correlation. Results revealed that 61.8% of extension workers fell between 50 years and above. Majority of respondents (74.5%) had more than 20 years of professional experience. It was found out that respondents were mostly distributed along Diploma and Senior School Certificate education (67.3%). Extension workers (85.5%) had moderate perception on ICT use. Respondents had single training (44.5%) within their organisation while 35.5% had no training on their job. The study concluded that extension workers (79%) fell under low level of ICT usage in providing extension services for farmers. Results showed that there was no significant relationship among selected personal characteristics like age, educational qualification, years of professional experience, perception on ICT use, job satisfaction and use of ICTs. The gap this study was unable to cover reflected mainly in determining the extent of use of ICTs by the extension workers. My current study was able to further concretize the frequency and duration of use of ICTs by obtaining an index of ICT use from the various categories of extension practitioners. This actually helped out in effectively capturing the full extent of use of these communication technologies by the respondents appropriately.

2.13 THEORETICAL AND CONCEPTUAL FRAMEWORK

2.13 Theoretical framework

This study adopts the use of three theories which are considered relevant to explaining the variables in this study, these include:

1. Actor network theory.
2. Structuration theory.
3. Time, Interaction and Performance (TIP) theory.

2.13.1 Actor-Network Theory (ANT)

This theory was advocated by Latour (1997) and Callon (1999). The theory suggests a heterogeneous network of humans and non-humans as equal interrelated actors. It strives for impartiality in the description of human and non-human actors and the reintegration of the natural and social worlds. For example, Latour (1992) argues that instead of worrying whether we are anthropomorphizing technology, we should embrace it as inherently anthropomorphic: Technology is made by humans, substitutes for the actions of humans, and shapes human action. Applying this theory to the present study, it has been observed that for any innovation to be readily accepted and adopted by the beneficiaries who are mostly farmers it has to pass through humans who can be represented by the various actors in the AKIS system as well as other medium such as ICTs e.g. phones, internet, iPad, etc. It equally shows that its use by extension practitioners can only be substantive if the technologies are readily available to various actors for extension delivery activities. This explains technology reintegration in the natural world of humans by the application of ICTs to extension work by various actors. It also however amplifies the limiting point exhibited through the use of ICTs. These mean that if these technologies are not accessible to the extension practitioners' use, it'll limit the actors in transferring relevant information to the target beneficiaries efficiently in their disseminating activities. The network or synergy of using both human and technology makes them interrelated actors in achieving a more concrete impact to the lives of the target beneficiaries in relation to delivery of extension services.

2.13.2 Structuration theory

This theory was authored by DeSantis and Poole (1990) and Orlikowski (1992). This theory showed that technology is not rendered as an artefact, but instead examines how people, as they interact with a technology in their on-going practices, enact structures which shape their emergence and situated use of that technology. Applying this theory to the present study, extension practitioners from the various actors in the Agricultural Knowledge and Information System (AKIS) system makes use of ICTs in the delivery of extension services to their target audience, with each actor being able to establish reliable structures thereby giving them a unique projection, identity and form that will automatically distinct each actors mode of operation for effective outcome of

their extension delivery approach or system. For instance, Non-Governmental Organisations, (NGOs), Agricultural Development Programmes, (ADPs), Farmers' Development Union (FADU), Justice Development and Peace Commission (JDPC), British American Tobacco (BAT), have been able to create their own niche and extension outreaches effectively through the use of one or more technologies and have been able to have a permanent or lasting effect on their target beneficiaries.

2.13.3 Time, interaction, and performance (TIP): this theory was originated by McGrath (1991). The theory describes work groups as time-based, multi-modal, and multi-functional social systems. Applying this theory to this study, shows that extension practitioner from various organisations uses these technologies to various degrees and reasonable extent in the course of discharging their extension obligation to their clientele. It also reveals that actors from various organisations exhibit various extension functions and strategies that further translate their use of technologies distinctively from each other. This automatically enhances each extension organisation utilisation of technologies when qualitative period of time is engaged by its staff. However, actors from various organisations cannot operate at the same frequency as regards the use of technologies; due to their varying extension modalities, functions and the degree to which these technologies are considered to be important to their disseminating activities.

2.13.4 Review of other theories used in related studies

A study on impact of ICT on agricultural extension service delivery by Tata and McNamara (2018) employed the Diffusion of Innovation theory by Rogers (1995). The theory centred on how innovation was disseminated through major channels over a period of time among members of a unit system. It further emphasised on the perceived characteristic of the innovation as the major tool of adoption with less focus on the social aspect of it. The limitation of this theory premised on the fact that it focussed more on single way procedure by using a top-down approach of sending innovation from sender to receiver. However, the theories used for my current study provided a more participatory approach by using variety of ICT tools which are suitable and relevant in passing up to date information to their clientele by the extension practitioners.

Another study by Sennuga, (2019) used social cognitive theory propounded by Bandura (1986) in a related work on use of ICTs among smallholder farmers and extension workers in Nigeria. The theory was based on how reasoning capability of an individual affects the behaviour of technology adoption alongside with interaction with the technology. The limitation of the theory was that it placed a greater relevance on the concept of self-efficacy (which emphasised on perception of an individual proficiency to using a technology to achieve a particular task at the initial stage of use). The theories used in relation to my work encapsulated the frequent use of ICTs by extension practitioners in performing their extension duties leads to greater proficiency in the long-run than at the initial stage before using the communication tools.

Moreover, Sennuga, (2019) also used the theory of planned behaviour postulated by Ajzen (1985). It explained the behavioural pattern of individual, available information and the consequence of the individual actions. It particularly emphasised more on prediction of an individual's intentions before carrying out an action. The study however has limitations based on the fact that it did not emphasise the interconnectedness of disseminating information through communication tools by individuals (sender) for the benefit of the receivers (farmers) as shown for the theories used in relation to my work.

2.14 Conceptual framework

2.14.1 Explaining the conceptual framework

Utilisation of ICTs is the dependent variable of this study while the independent variables are personal and professional characteristics of categories of extension practitioners, knowledge of ICTs use, perception on ICT use, extension delivery strategies, various ICT tools accessible to the practitioners, extent of use of ICT tools, relevance of these tools to their extension duties and constraints limiting their use and access of ICT tools in their duties.

In analysing the use of ICTs for extension service delivery among extension practitioners in southwest Nigeria, the roles played by the independent and intervening variables in explaining the dependent variable were conceptualised and captured. Figure 1 reveals that professional characteristics of respondents will influence their extension delivery strategies. For instance, as years of professional experience of extension practitioners increases, it will enable them to optimally use extension strategies that can

make their extension work much more effective. Also availability and accessibility of ICT tools used in the various organisations will influence the level of knowledge of the practitioners. This explains the fact that the more available and accessible an ICT tool is, the greater the level of knowledge exhibited by extension practitioner on the use of such technology in the course of performing their extension duties. Conclusively, their level of knowledge on the use of ICT can also determine the extension practitioners' perception on the use of ICTs. This shows that as extension practitioners displays a high level of knowledge on ICT use; it will help them in exhibiting a favourable disposition to using it more in their extension work.

The restraining factors include the constraints faced by the practitioners in providing their services as this will seriously limit the practitioners' access and use of ICT tools in giving their best towards excellent extension service delivery. These include epileptic power supply, inadequate financial resources, lack of relevant infrastructures, poor internet facilities, gender restrictions etc.

However, in-between these independent variables and the dependent variable, there are forces that are not investigated in this study even though they are expected to wield influence on the relationship between the independent and dependent variable of the study. These forces are known as intervening variables in the framework. Some of the intervening variables are government policy on extension services, operational mandate of each extension organisations and public sector reforms. Government policy on agriculture can facilitate or hinder the running of extension services to farmers. Public sector reforms can stagnate or limit the progress made by various extension organisations, the operational mandate of each of the organisation may influence the type of extension services provided and the manner at which the recipients (farmers) will perceive extension services received from the organisations.

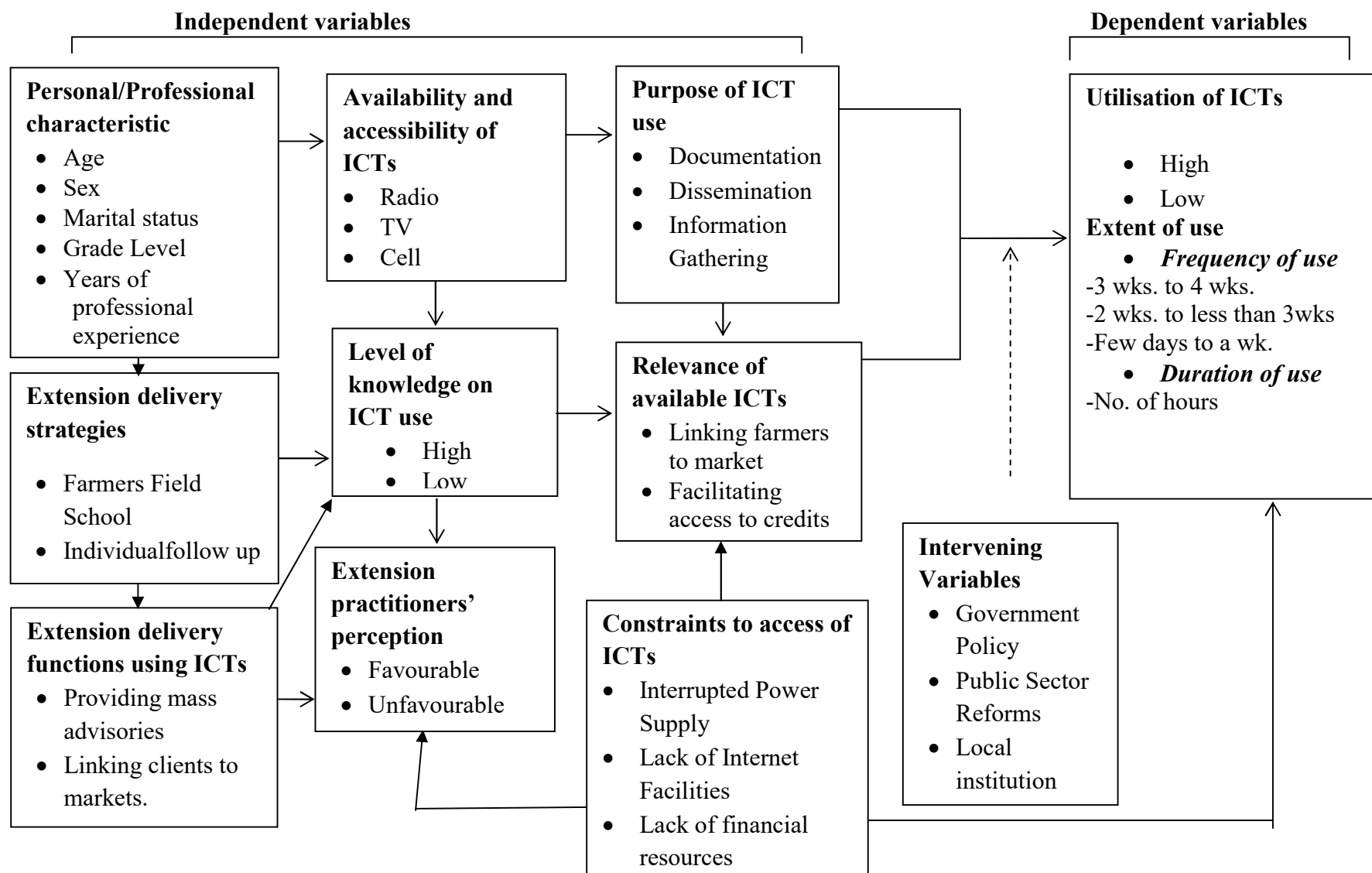


Fig 1: Conceptual framework of utilisation of ICTs for Agricultural Extension delivery among extension practitioners in Southwest, Nigeria

CHAPTER THREE

METHODOLOGY

3.0

3.1 Study area

The study was carried out in Southwestern Nigeria. The Southwestern Nigeria comprises of six states namely; Lagos, Osun, Oyo, Ogun, Ondo and Ekiti States. The area lies between latitudes 6°30' to 9°0' North and longitudes 3°0' East to 5°30' East of the Greenwich meridian. Southwestern Nigeria is bounded in the South by the Atlantic Ocean, in the East by Edo and Delta states, in the West by the Republic of Benin and in the North by Kwara and Kogi States. The area covers about 114,271km² which is approximately 12% of Nigerians total land area (National Agricultural Research Programme, 2016). Agricultural sector forms the base of all the overall development thrust of the zone. It has a population of 33,045,477 constituting approximately 20 percent per annum (<http://nigeria.opendataforafrica.org/xspplpb/nigeria-census>, 2016).

The zone covers an area ranging from swamp forest to western uplands. In between are rain forests, mosaic savannah and deciduous forest. The climate in Southwestern Nigeria is predominantly humid with rainfall ranging from 1500mm to 3000mm per annum. The mean monthly temperature ranges from 18 to 24 during the rainy season and between 20 and 35 during the dry season. The rainfall pattern is bimodal with the peaks in June, early July and September, while November to February is characterised by harmattan brought about by the effect of the north eastern trade winds from the Sahara region. This favours the planting of arable crops (beans, rice, wheat, barley, nuts, cassava, melon, millet, maize, yam, soybeans, etc.) and tree crops (rubber, cocoa, cotton, groundnuts, cashew, oil palm, coffee, etc.). Apart from the existence of government extension agencies in each of the States; there is high concentration of NGOs, interested in agricultural extension services justifies the choice of the area for the study. Figure 2 shows the map of Nigeria indicating the selected states in the southwestern region used for the purpose of this study.

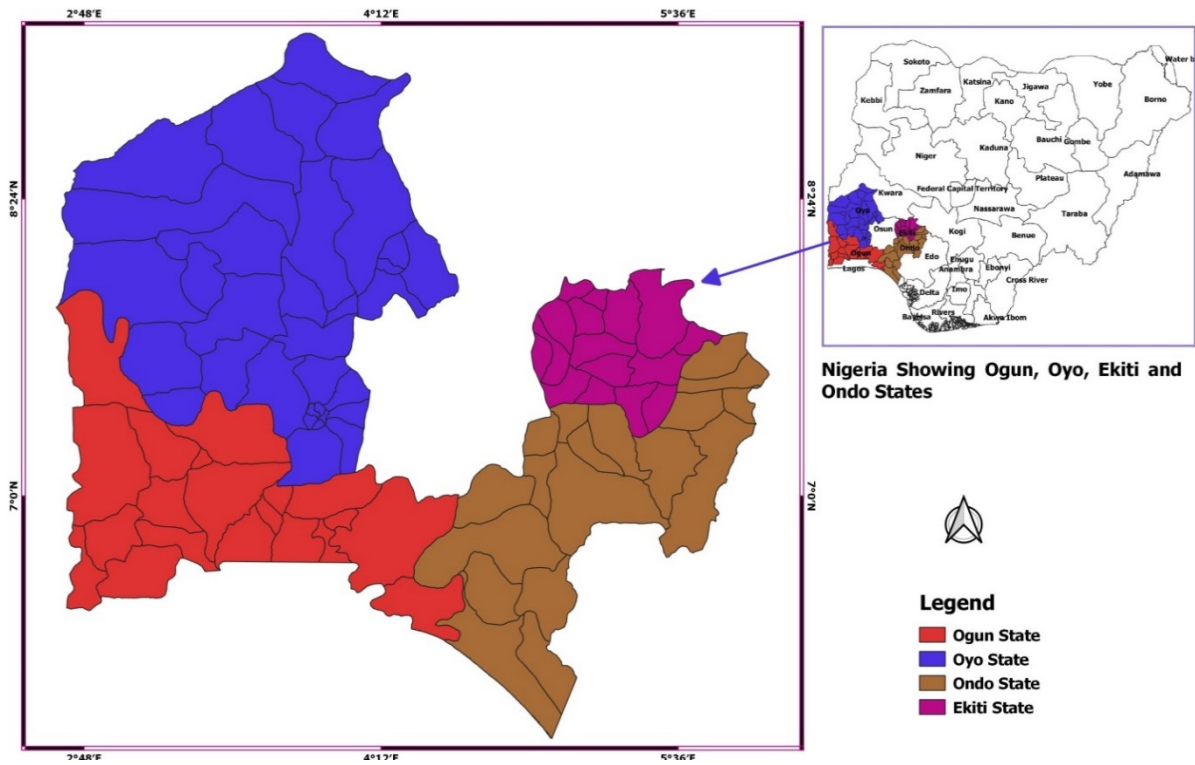


Figure 2: Map of Nigeria showing the selected states in the southwestern region
Source: Field work (2017)

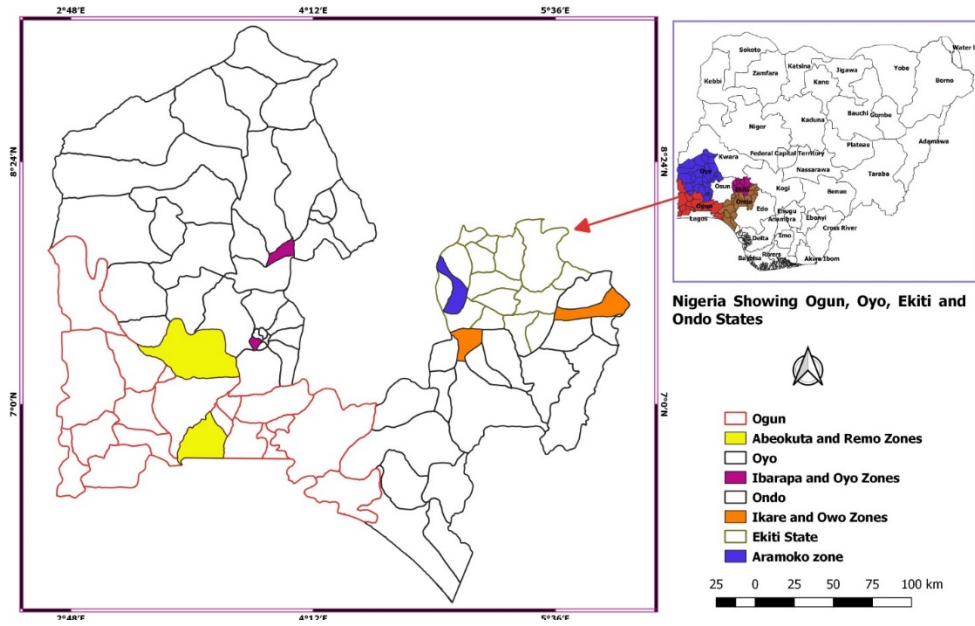


Figure 3: Map of Nigeria showing selected states and zones used for public organisations in the southwestern region

Source: Field work (2017)

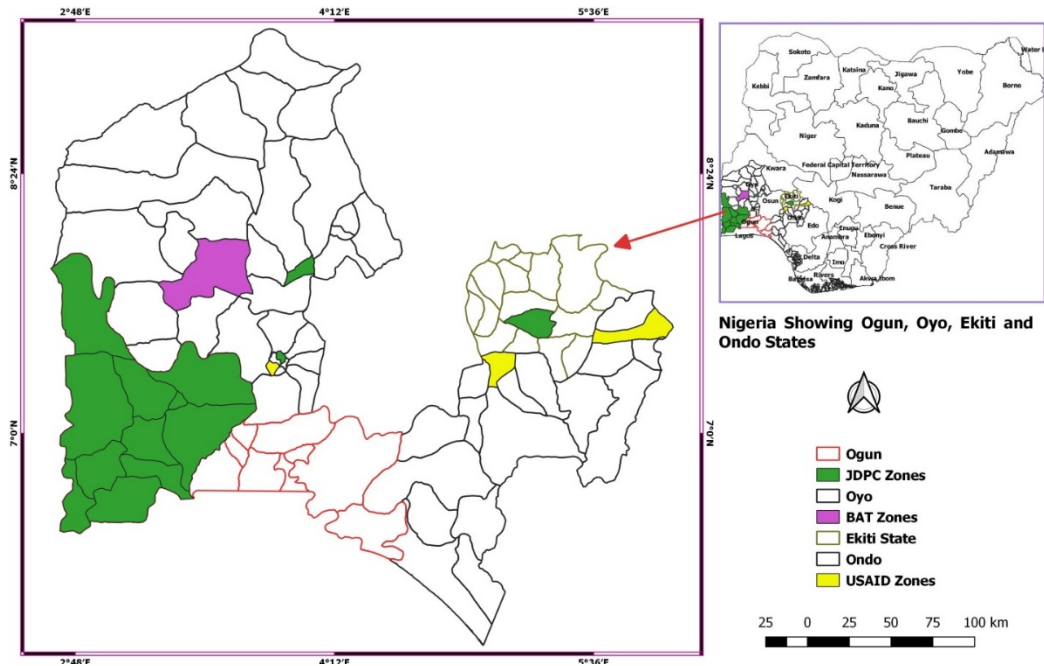


Figure 4: Map of Nigeria revealing selected states and zones used for non-public organisations in the southwestern region

Source: Field work (2017)

3.2 Population of the study

The study population comprises all extension practitioners in the public (Agricultural Development Programme), and non-public organisations which comprise of private (British American Tobacco), Non-Governmental Organisation (Justice Development and Peace Commission) and Intergovernmental (United State Agency and International Development) extension organisations in southwestern, Nigeria.

3.3 Sampling procedure and sample size

3.3.1 Sampling procedure for private organisation (profit-based) BAT

A multi-stage sampling procedure (which comprises of a three-stage sampling procedure) was used to select the extension practitioners giving extension services to the farmers. The first stage involved purposive selection of Oyo state based on the fact that it is the only state where BAT agricultural extension arm is operational in the southwest region. The second stage involved purposive selection of Iseyin local government area where their extension outfit is operationally based. The third stage involved ascertaining the actual number of extension agents in the organisation by obtaining a list of all their extension agents in the organisation and selection of all the extension agents in the organisation (which was the total census obtainable). Thus, a total of 10 extension agents were drawn from the organisation. This is as shown below in Table 2.

3.3.2 Sampling procedure for inter-governmental organisation (USAID)

A multi-stage sampling procedure (which comprises of a three-stage sampling procedure) was used to select the extension practitioners giving extension services to the farmers. The first stage involved purposive selection of two states which are Oyo and Ondo states; based on the fact that these are the two states USAID are mainly operational in southwest region. The second stage involved the purposive selection of the zones their extension outreaches was operationally based. The third stage involved ascertaining the actual number of extension agents in the organisation by obtaining a list of all their extension agents in the organisation and selection of all the extension agents in the organisation (which was the total census obtainable). Hence, an aggregate of 10 respondents were selected from the two states. This is as shown below in Table 2.

3.3.3 Sampling procedure for private organisation (non-profit based) JDPC

A multi-stage sampling procedure (which comprises of a three-stage sampling procedure) was used to select the practitioners in this organisation. The first stage involved simple random sampling of 3 states which are Oyo, Ekiti and Ogun states out of the four states where JDPC are operationally based (excluding Ondo and Lagos states). The second stage involved purposive selection of operational dioceses where they carry out their agricultural extension service delivery. The third stage involved ascertaining the actual number of extension agents in the organisation by obtaining a list of all their extension agents in the agency and selection of all the respondents (which was the total census obtainable). Hence, an aggregate of 21 respondents were selected from the organisation. This is as shown below in Table 2.

Table 2: Sampling procedure for (other organisations) BAT, USAID and JDPC

Organisation	State	Number of extension operational entity	Number of extension personnel	Number of selected staff	Total
BAT	Oyo	1 (Iseyin)	10	10	10
USAID	Oyo	2 (Ibadan and Oyo)	5	5	
	Ondo	2 (Owo and Ikare)	5	5	10
JDPC	Oyo	2 (Ibadan, Oyo)	13	13	
	Ekiti	1 (ekiti)	4	4	
	Ogun	2 (Abeokuta and Ijebu ode)	4	4	21
Grand Total					41

Source: Field work(2017)

3.3.4 Sampling procedure for public extension organisation (ADPs)

A multi-stage sampling procedure (which comprises of a three-stage sampling procedure) was used to sample public extension practitioners. The first stage involved simple random sampling of four states (Oyo, Ondo, Ekiti and Ogun states) out of the six states that makes up the southwestern geopolitical zone of Nigeria. The second stage involved the random selection of the zones from the selected states by sampling 50% of the zones within each state. The third stage involved ascertaining the actual number of extension agents from the organisation by obtaining a list of all their extension agents in the agency. The fourth stage involved simple random sampling of 30% of the extension agents was drawn from each of the selected zones (i.e.124 respondents were drawn from ADP in the 4 states). Therefore a grand total of 165 extension practitioners from the four various organisations was subsequently interviewed across the four organisations. This is as shown below in Table 3.

Table 3: Sampling procedure for Agricultural Development Programme (ADP)

State	Number of ADP zones	Selected zones (50%)	Number of field staff in selected zones (30%)	Number of field staff selected from zone	Total
Oyo	4	2 (Oyo, Ibadan/Ibarapa)	81	31	31
Ondo	4	2(Owo&Ikare)	92	27	27
Ekiti	2	1 (Aramoko)	102	36	36
Ogun	4	2 (Remo, Abeokuta)	90	30	30
Total				124	

Source: Field work(2017)

3.4 Source of data and instrument for data collection

This study utilised primary data. Data collection was carried out through the use of well-designed questionnaire. Open and close ended questions (questions were given to respondents to fill in the answers as well as tick the available options given to them) were contained in the structured questionnaire and these were filled directly by the extension practitioners. Moreover, an in-depth interview to seek pertinent information on organisational policies, practices and standards in the use of ICT was also conducted.

3.5 Validation of instrument

The content validity of the instrument used for data collection was done to ascertain that the required information within the framework of the objectives of the study was measured. The supervisor of the researcher and other professionals in the Department of Agricultural Extension and Rural Development did face validity of the instrument to make certain suitability of the instrument for the study.

3.6 Reliability of the instrument

Split half method was employed in testing the reliability of the instrument. A reliability coefficient of 0.75 was obtained for this study. Sixty extension practitioners from the four various organisations (i.e. from ADP, BAT, JDPC and USAID, 15 respondents were selected respectively in Kwara state). These were used to test for the reliability of the instrument.

3.7 Measurement of Variables

3.7.1 Independent variables

SECTION A: Personal and professional characteristics.

- 1. Age:** The ages of the respondents were specified in years.
- 2. Sex:** The sex of the respondents was identified as follow; male and female were assigned nominal values of 1 and 2 respectively.
- 3. Marital status:** The listed are the options listed for marital status of respondents: single, married, divorced, widowed; the nominal values assigned to them are 1, 2, 3, 4 respectively.

4. Educational attainment: From the highest to the lowest level of educational attainment, participants were requested to state their highest level of educational attainment.

5. Religion: Three options on religion to choose from were presented to the respondents. These were: Christianity, Islam, traditional with minimal values of 1, 2 and 3 allotted to each respectively.

3.7.2 Professional characteristics

6. Years of professional experience: The number of years respondents had used in their profession was specified.

7. Position in the organisation: The current position of the respondent in their various organisations was specified.

8. Type of ICT training exposed to: Respondents were asked to indicate the type of ICT training they have been exposed to in their various organisations among the listed options: either at the diploma level, intensive course, in-house training, external training and certificate level.

3.7.3 Respondents' knowledge levels as regards the ICT use for their information dissemination activities

Respondents were given a list of ICT tools consisting of fourteen items with their functions listed under each of the tools. These were stated in a 42 knowledge statements with each asking how the respondents made use of each ICT tools for extension activities. Respondents' were made to respond to each question as much as they know by choosing from the multiple answers provided. The real answer was treated as correct indicating 1, while the false answer was treated as incorrect indicating 0. They were asked to indicate how knowledgeable they were in the use of the ICT tools for extension activities. A minimum and maximum score of 0 and 42 were obtainable from the 42 knowledge statements respectively. The mean value obtained was 23.6 ± 5 . Furthermore, extension practitioners' responses were assessed and rated; with their knowledge mean score as 23.6 ± 5 . Those who scored between 8 and just below the mean were categorised

as having low level of ICT knowledge, while those who scored between the mean and maximum score of 35 were categorised as having high level of ICT knowledge.

3.7.4 ICT tools available and accessible to the various extension practitioners

Respondents were given a list of ICT tools consisting of fourteen items, with each operationalised as either available or not available. Scores of 1 and 0 were attached to these accordingly. Respondents were required to specify which of these tools were available in their various organisations. A minimum score of 0 and a maximum score of 14 was obtained from the 14 items. The prominent tool was identified for use in their extension work.

Respondents were offered a list of ICT tools consisting of 14 items with each appended to a scale of very accessible, rarely accessible and not accessible. Scores of 2, 1 and 0 were accorded to each item correspondingly. They were requested to specify which of the ICT tools was accessible in their various organisations. Minimum and maximum scores of 0 and 28 were obtained from the 14 items respectively. Mean score of 15.2 ± 5 was obtained. This was used to verify which of the ICT tools were most accessible by each organisation on the premise of individual score gotten from the mean. This was interpreted as organisation with mean value and above were considered as those with most accessible tools while organisations that falls below the mean value were considered as those not accessible to the tools.

3.7.5 Purpose and extent to which each of the ICT tools are used for specific extension delivery activities

The purpose to which each ICT tools are subjected to were classified under these 3 major extension purposes i.e. (Documentation, Dissemination and Information gathering purposes) and these were measured on a four-point scale of always (about 25 days in a month), sometimes (about 17 days in a month), rarely (about 10 days in a month) and never (Nawrotzki, Lori and Thomas, 2012). Scores of 3, 2, 1, and 0 were assigned respectively. The minimum score was 0 and the maximum score was 42. The mean score was computed and used to determine the purpose to which each of the ICT

tools were being subjected to most. The mean value and above indicated the effectiveness of their disseminating capacity for each of the various organisations.

Moreover, the extent of use of these tools was determined through a fourteen item list of ICT tools for each of the varied extension functions which serves as essential components towards achieving effective extension service delivery e.g. linking farmers to markets, raise general awareness of opportunities, provide technical information, diagnose problems and recommend solutions, facilitate access to credits and inputs, provide mass advisories, respond to follow up questions raised by clients, conduct surveys, enumerations, monitoring and evaluation, and assists with business planning. These were measured on a four-point scale of always (about 25 days in a month), sometimes (about 17 days in a month), rarely (about 10 days in a month) and never. Scores of 3, 2, 1, and 0 were assigned respectively. Mean score was calculated and used to measure the extent to which each of the ICT tools were used for extension functions being carried out by each of the various organisations. The mean value of 22.62 was obtained for raising awareness about opportunities which poses to be the most efficient extension function being carried out by each of the various organisations.

3.7.6 Relevance of ICT tools in their agricultural activities

Respondents were required to specify to what extent each of the ICT tools used were deemed relevant in their extension activities. Twenty-five relevance statements were generated for each of the ICT tools and their relevance was measured on a three-point scale of Very Relevant, Somewhat Relevant and Not Relevant. Scores of 3, 2, and 1 were accorded to the responses for each statement. Minimum and maximum scores of 25 and 75 were obtained accordingly. For each of the ICT tool, the mean scores was calculated and used to determine the respondents' order of relevance as regards their dissemination activities.

3.7.7 Extension delivery strategies used by the various organisations

Respondents were asked to state and indicate the extension delivery strategies employed in their various organisations. A list of strategies was provided like: Farmers Field School (FFS), demonstration plots and individual follow-up, lead farmers and specialized training, credit schemes and saving initiative, value chain and market integration development and Training and Visit. The list was matched with how often these strategies were being used whether as always, sometimes, rarely and never. Respondents were therefore asked to indicate the frequency at which each of these extension delivery strategies were being carried out or used for each of the extension organisation they were representing on a four-point scale of Always, Sometimes, Rarely and Never. Scores of 4, 3, 2, and 1 were assigned respectively.

3.7.8 Perception on ICT use

Respondents' perception as regards the use of ICTs in carrying out their extension obligations was determined by ensuring that they react to 24 perceptual statements on a five Likert-type scale of Strongly agree (SA), Agree (A), Undecided (U), Disagree (D), and Strongly disagree (SD). Scores of 5, 4, 3, 2 and 1 were accorded to positively worded statements while the reverse holds for negatively worded statements. Respondents' perception on ICT use was measured with a twenty- four item of positive and negative statements. The minimum score was 24 while the maximum score was 120. Mean perception score of 79.2061 was obtained and used to categorise respondents into favourable and unfavourable perception on ICT use with respect to their various organisations.

3.7.9 Constraints limiting the access and use of ICT

The constraint variables used in this study were constraints to access and constraints to use of ICTs. Respondents were required to specify how serious they have observed the constraints listed below to limiting their access to ICT use. Scores of 0, 1 and 2 were assigned to not a constraint, mild constraint and serious constraint respectively. The constraints that limit their access were listed as epileptic power supply, inadequate financial resources, poor internet facilities, high-cost of hard ware, non-

affordability, lack of technology appropriateness and lack of relevant infrastructures. The minimum score was 0 while the maximum score was 18. The mean of each of the listed constraint was calculated used to determine the order of severity of the constraints that limit their access to ICT. Also, respondents were required to specify how serious they have observed the constraints listed below to limiting their use of ICT. Scores of 0, 1 and 2 were assigned to not a constraint, mild constraint and serious constraint respectively. The constraints limiting their access were listed as low financial resources, dearth of technical know-how, low level of computer education, gender restriction, inadequate investments, inconsistency in the payment of allowance or salary, inherent need in capacity building, difficulty in integrating with existing media. The minimum score was 0 while the maximum score was 16. The mean of each of the listed constraint was calculated used to determine the order of severity of the constraints that limit their use of ICT.

3.8 Dependent variable

Utilisation of Information and Communication Technologies for extension service delivery is the dependent variable of this study. This was measured by providing the respondents with a list of 14 items of ICT tools. Respondents were asked to indicate the “frequency of use” and the duration of use (average number of hours in the period) indicated for each of the ICT tools. They were asked to choose the frequency of use from the response options such as from 3 weeks to 4 weeks, 2 weeks to less than 3 weeks, few days to a week and not at all. Also, the respondents were asked to indicate the “duration of use” of the ICT tools in line with the “frequency of use” indicated for each of the tools; using the approach of Nawrotzki *et al*(2012). The duration of use in the period indicated was assigned 1 for an hour spent, (2 for 2 hours and so on) while zero hour spent on the tools was assigned 0. Data collected in minutes was converted to hours by dividing the minutes by sixty.

An index of extent of use of ICT components was obtained by multiplying the scores from the responses to the “frequency of use” and “duration of use”. Furthermore, extension practitioners’ responses were assessed and rated; with their utilisation mean score as 93.50. Those who scored between 0 and just below the mean were categorised as

having low level of ICT utilisation, while those who scored between the mean and maximum score of 443.00 were categorised as having high level of ICT utilisation.

3.9 Analysis of data

Data was analysed using descriptive (frequency and percentages and mean) and inferential (Chi-square, T-test, ANOVA and Pearson Product Moment Correlation) statistics were used. The threshold for the determination of significant variables was at $p=0.05$.

- a. Chi-square, Pearson Product Moment Correlation and Linear regression were used in analysing hypothesis one.
- b. Pearson Product Moment Correlation (PPMC) was used in analysing hypothesis two.
- c. Pearson Product Moment Correlation (PPMC) was used in analysing hypothesis three.
- d. Pearson Product Moment Correlation (PPMC) was used in analysing hypothesis four.
- e. Pearson Product Moment Correlation (PPMC) was used in analysing hypothesis five.
- f. Analysis of Variance (ANOVA) and independent sample t-Test were used in analysing hypothesis six.
- g. Analysis of Variance (ANOVA) and independent sample t-Test were used in analysing hypothesis seven.
- h. Analysis of Variance (ANOVA) and independent sample t-Test were used in analysing hypothesis eight.

3.10 Limitation and delimitation of the study

It was observed that United State Agency for International Development (USAID) organisation was mainly using extension personnel from Agricultural Development Programme through their extension supervisors who stand as service providers to USAID organisation. The extension personnel from ADP were used for extension delivery activities of USAID organisation without any feasible intervention to

improve the capacity for utilisation of ICTs. This suggests that the capacity for personnel of extension service of ADP is what will represent the capacity for personnel of USAID organisation. It however limited the unique impact the USAID organisation ought to have made on their utilisation of ICTs at this period.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.0

4.1 Extension practitioners' personal and professional characteristics for public organisation

Age-More of the respondents (41.9%) were within the highest age range of 33 and 42 years, while a minimum number of respondents (8.9%) had the lowest age range of 53 and 62 years. The distribution shown in Table 4.1 revealed that the extension practitioners had an overall mean age of 39.91 ± 8.33 years. This shows that respondents from public organisations are in their active years. This tends to have profound implication for active technology usage as they tend to be more receptive to new innovations and enthusiastic in disseminating agricultural-related information through the few available ICT tools in performing their various extension duties. This finding is in line with the outcome of the work of Listiana, Efendi, Mutolib and Rahmat (2019), who also found out that the mean age of extension personnel working with the state governments were closely within 40 years of age in Lampung Province. This shows that majority of the extension practitioners employed in various government owned organisations falls into this young dynamic age group.

Sex- Distribution of the extension practitioners by sex revealed that 79.0% were male, while 21.0% were female. This finding implies that the male-female ratio in public extension service is not well balanced and as such this could stimulate the use of ICTs more, so as to cover up for the void created through gender disparity. This confirms the finding of (Oladele, 2015) as regards restriction exhibited during extension delivery on the basis of client-service provider relationship.

Marital status- The distribution of this variable shows that 76.6% were married, while 23.4% were single with. This finding explains that majority of the respondents were expected to have been married. This gives credence to the works of (Benjamin,

Onu, Jungur, Ndaghu and Giroh, 2016) and (Yakubu, Abubakar, Atala, Muhammed and Abdullahi, 2013) who established that clients normally have a positive disposition to married extension providers. This implies that marriage is probably more emphasised among agricultural extension providers irrespective of the organisation they belong to, as they tend to earn more trust and respect from their clients in the course of disseminating their extension duties.

Highest level of educational qualification- This reveals that the personnel were mostly distributed along HND educational qualification (40.3%). It has been observed that this level of educational qualification portends to be the dominant educational qualification for employment entry into the public extension service organisations. This finding is in line with that of Olaolu, Agwu, Ivande and Olaolu (2018) who emphasised that educational level of public extension personnel was mostly at HND or first degree level. This might further play a major part in the extension personnel technology inclination and usage.

Years of professional experience- Result shows that 66.9% fell within the range of 1 to 10 years of professional experience, while 0.8% fell within the range of 31 to 40 years of professional experience. The mean years of work experience is 10.29 ± 8.24 years. This suggests that most of the respondents' were within their active years in their job and as such position them to be more ICT inclined to enabling them meet up with the dissemination of their agricultural duties. Similarly, the finding is in agreement with that of Agha, Ghangas and Chahal (2018) who revealed that majority of the extension agents had minimum professional experience that is up to 10 years.

Exposure to information and communication technologies training- Result shows the category of technology the respondents were exposed to as in-house training (38.7%), while 7.3% had degree programme training on ICT. This shows that the proportion of in-house training received by respondents on ICT use within the organisations was not remarkable. This may probably influence the extension practitioners' disseminating capacity in the course of carrying out their extension duties. The implication of this finding is that the minimal exposure to in-house training by the respondents may be as a result of the few available ICT tools that are on ground for their extension work within the public extension organisations. This confirms (DLEC, 2018)

project report which emphasised that most government based organisation are deficient in technology capacity as regard ICT training for their staff. .

Table 4.1: Distribution of respondents by personal and professional characteristics in Public extension organisation (ADPs)

Characteristics	Category	Frequency	Percentage	Mean
Respondents' age (years)	22-32	29	23.4	39.91±8.33
	33-42	52	41.9	
	43-52	32	25.8	
	53-62	11	8.9	
Sex	Male	98	79.0	
	Female	26	21.0	
Marital status	Married	95	76.6	
	Single	29	23.4	
Highest level of education	OND	3	2.4	
	HND	50	40.3	
	BSc	48	38.7	
	MSc	20	16.1	
	PGD	1	0.8	
	PhD	2	1.6	
Years of Professional Experience	1-10	83	66.9	
	11-20	25	20.2	
	21-30	15	12.1	
	31-40	1	0.8	
Exposure to ICT Training	None	17	13.7	
	Degree programme	9	7.3	
	Diploma	12	9.7	
	Intensive course	12	9.7	
	In-house training	48	38.7	
	Certificate course	26	21.0	

Source: Field work (2017)

4.1.2 Extension practitioners' personal and professional characteristics for non-public organisations

Age–More of the respondents (41.5%) falls within the highest age range of 33 and 42 years, while a minimum number of respondents (14.6%) had the lowest age range of 53 and 62 years. The distribution shown in Table 4.2 revealed that the extension practitioners had an overall mean age of 40.44 ± 10.20 years. This shows that the respondents are within their active years. This probably shows that they are liable to being more receptive to new innovations and eager to disseminate agricultural-related information through the available ICT tools in their various organisations. This finding is in line with the outcome of the work of Umar, Musa, Olayemi, Muhammed and Suleiman (2015), who also found out that the ages of extension personnel were within 40 years of age in organisations. This shows that majority of the extension practitioners employed in various organisations falls into this young dynamic age group.

Sex–Distribution of the extension practitioners by sex revealed that 78.0% were male, while 22.0% were female. This finding implies that male to female gender ratio in non-public organisations also suffers imbalance relative to the extension service delivery of the respondents to their target clientele. This tend to probably pave a better way to the use of ICTs more, in covering the wide gender gap created through patron-client relationship for their extension delivery activities. This buttresses the findings of (Olanrewaju, Farinde and Oloyede, 2017) as regards disproportionate gender ratio of agricultural extension personnel in the country and consequently helps in amplifying the use of ICTs in bridging up this gender gap. .

Marital status- The distribution of this variable shows that 82.9% were married while 17.1% were single. This finding explains that majority of the respondents were expected to have been married. This explains what Benjamin *et al* (2016) also found out that clients are positively disposed to married extension providers as society places high level of respect on the status of married people. This implies that marriage is probably more emphasised among agricultural extension providers as they tend to earn more respect in the course of disseminating their extension duties.

Highest level of educational qualification- This reveals that the 38.7% of personnel were mostly distributed along the BSc educational qualification. It has been

observed that this first degree qualification tend to be the dominant educational qualification for employment entry into the non-public extension service organisations. This finding is in line with (DLEC, 2018) which buttressed that few extension personnel tend to possess BSc or other higher degrees as entry qualification into other extension organisations apart from the ones owned by the governments. This might further play a major part in the extension personnel technology inclination and usage.

Years of professional experience- Result shows that 70.7% fell within the range of 1 to 10 years of professional experience while none fell within the range of 31 to 40 years of professional experience. The mean years of work experience is 9.05 ± 6.59 years. This suggest that majority of the respondents are within their active years on their job. This has the tendency of making them to be more receptive to better ways of using ICTs in rendering essential services as well as in the disseminating of their extension obligations to their clientele. Similarly, the finding is in agreement with that of Agha, Ghangas and Chahal (2018) who revealed that majority of the extension agents had minimum professional experience that is up to 10 years.

Exposure to information and communication technologies training-Result shows the category of technology the respondents are exposed to as in-house training (53.7%) while 4.9% had no exposure to ICT training. This shows that respondents had more training on ICT use within the organisations. This may probably enhance the extension practitioners' disseminating capacity in the course of carrying out their extension duties. This implies that the more ICT training the respondents becomes exposed to within the organisation, the better the utilisation of such communication tools efficiently in their extension activities. This supports the work of Listiana *et al*, 2019 who established that extension personnel performance is more enhanced when exposed to adequate trainings from within but emphasised further that training should not be limited towards in-house training alone but should also come from other various external contexts to make it more encompassing and dynamic.

Table 4.1.2: Distribution of respondents in non-public extension organisations by personal and professional characteristics (BAT, JDPC and USAID)

Characteristics	Category	Frequency	Percentage	Mean
Respondents' age (years)	22-32	8	19.5	40.44±10.20
	33-42	17	41.5	
	43-52	10	24.4	
	53-62	6	14.6	
Sex	Male	32	78.0	
	Female	9	22.0	
Marital status	Married	34	82.9	
	Single	7	17.1	
Highest level of education	OND	4	9.8	
	HND	8	19.5	
	BSc	20	48.8	
	MSc	8	19.5	
	PGD	1	2.4	
Years of Professional Experience	1-10	29	70.7	
	11-20	10	24.4	
	21-30	2	4.9	
	31-40	0	0	
Exposure to ICT Training	None	2	4.9	
	Degree programme	5	12.2	
	Diploma	4	9.8	
	Intensive course	4	9.8	
	In-house training	22	53.7	
	Certificate course	4	9.8	

Source: Field work (2017)

4.1.3 Summary of extension practitioners' personal and professional characteristics

Age –Summary of extension practitioners' personal and professional characteristics showed that more of the respondents (41.6%) falls within the highest age range of 33 and 42 years, while a minimum number of respondents (10.2%) had the lowest age range of 53 and 62 years. The distribution shown in Table 4.3 revealed that the extension practitioners had an overall mean age of 40.0 ± 8.0 years. This shows that they are in their active years. This tends to have profound implication for active technology usage as they tend to be more receptive to new innovations and liable to disseminate this information promptly in their extension activities. This finding is in line with the findings of Umar, Musa, Olayemi, Muhammed and Suleiman (2015) who also found out that the ages of extension personnel were within 40 years of age. This shows that majority of the extension practitioners employed in various organisations falls into this young dynamic age group.

Sex–Distribution of the extension practitioners by sex revealed that 78.8% were male, while 21.2% were female. This finding implies that the male-female ratio in extension service may face some challenges related to interaction to clientele, owing to the fact that traditional African culture generally does not permit close interaction between female and male strangers, especially in Muslim communities. This confirms the finding of (Ladele, Igodan, Agunga and Fadairo, 2015) as regards restriction exhibited during extension delivery on the basis of client-service provider relationship.

Marital status- The distribution of this variable shows that 78.2% were married while 21.8% were single. This finding explains that majority of the respondents were expected to have been married, since their average overall mean age was 40.0 ± 8.0 years. This year gives an average age an individual is said to have been married. This shows that Dada and Idowu (2017) also found that clients are positively disposed to married extension providers as society places high level of respect on the status of married people who are expected to be responsible in carrying out their duties. This implies that marriage is probably more emphasised among agricultural extension providers as they tend to earn more respect in the course of disseminating their extension duties.

Highest level of educational qualification- This reveals that the personnel were distributed along the BSc and HND educational qualifications. It has been observed that these two levels are probably the dominant educational qualification for employment entry into the extension service organisations. This finding is in line with that of Benjamin, Onu, Jungur, Ndaghu, and Giroh (2016) who emphasised that educational levels of extension personnel were mostly at BSc and HND levels. This might further play a major part in the extension personnel technology inclination and usage.

Years of professional experience- Results shows that 67.9% fell within the range of 1 to 10 years of professional experience while 0.6% fell within the range of 31 to 40 years of professional experience. The mean years of work experience is 9.9 ± 7.0 years. This suggest that that respondents are within the active range of their professional extension service engagement, and are prone to learning new ICT skills in transferring relevant agricultural innovations to their clientele. Similarly, the finding is in agreement with Kolawole, Isitor and Owolabi (2016) who revealed that majority of the extension agents had a professional experience of more than 9 years. This implies that young extension practitioners constitute the major work force in extension organisations and as such considered to be predisposed to acceptance of new innovations relating to ICT use.

Exposure to information and communication technologies training-Result shows the category of technology the respondents are exposed to as in-house training (42.4%) while 8.5% had degree programme training. This shows that respondents had appreciable training on ICT use within the organisations. This may probably enhance the extension practitioners' disseminating capacity in the course of carrying out their extension duties. The implication of this finding is that those that are more trained will have the likelihood of using these technologies effectively in their extension work (Adeel, Faisal and Abdulrahman, 2016).

Table 4.1.3: Summary of distribution of respondents' personal and professional characteristics

Characteristics	Category	Frequency	Percentage	Mean
Respondents' age (years)	22-32	37	22.3	40±8
	33-42	69	41.6	
	43-52	42	25.3	
	53-62	17	10.2	
Sex	Male	130	78.8	
	Female	35	21.2	
Marital status	Married	129	78.2	
	Single	30	21.8	
Religion	Christianity	134	81.2	
	Islam	31	18.8	
Highest level of education	OND	7	4.2	
	HND	58	35.2	
	BSc	68	41.2	
	MSc	30	18.2	
	PhD	2	1.2	
Years of Professional Experience	1-10	112	67.9	
	11-20	35	21.1	
	21-30	17	10.3	
	31-40	1	0.6	
Exposure to ICT Training	None	19	11.5	
	Diploma	16	9.7	
	Intensive course	16	9.7	
	In-house training	70	42.4	
	Certificate course	30	18.2	

Source: Field work (2017)

4.2 Extension practitioners' knowledge levels on use of ICT for extension delivery

The findings from Table 4.2.1 reveal that 54.5% of respondents fell within those with high level of knowledge and 45.5% of respondents fell within those with low level of knowledge. The implication of this finding is that respondents' without adequate knowledge of these tools will not be able to use them often and efficiently in the course of rendering their extension obligations. While those with high level of knowledge stands at the advantage of using these ICT tools more often and efficiently in their extension work. This finding is in line with the work of (Dishant and Lakshminarayan, 2018) who found out that extension personnel's high knowledge of ICT use is dependent on their frequent use in extension work. It was also found out that respondents had high knowledge in the use of computer for their extension work, while respondents on the other hand also exhibited low knowledge in the use of CD rom and fax in the course of disseminating their extension duties. This infers that these later ICT tools might not be available in most of the extension organisations these extension practitioners represent. In cases where these tools are available, accessing the tools for their extension work might be cumbersome due to lack of technical know-how and inherent need in capacity building in using it efficiently for their extension activities.

The study went ahead to look at categorisation of respondents into those of public organisation and non-public organisations. Findings from Table 4.2.2 revealed the level of knowledge between public extension practitioners and extension practitioners from other organisations in the use of ICTs. Half of the respondents (50.0%) from public organisation, fell within those with high level of knowledge and low level of knowledge concurrently. Whereas 68.3% of respondents from non-public organisations fell within those with high knowledge, while 31.7% of respondents fell within those with low level of knowledge of ICTs. This implies that a greater proportion of extension practitioners from the non-public organisations (BAT, JDPC and USAID) exhibit higher degree of knowledge on ICT use, while an average number of extension practitioners from the public organisation also exhibit a high level of knowledge on ICT use. This shows that respondents from the non-public organisations tend to be more exposed to trainings on ICT use through capacity building in their extension work over the other respondents

from public organisations. This must have been necessitated by full and financial support given by the private, non -governmental and intergovernmental organisations at their varying capacities to ensure they invest in relevant infrastructures for more efficient extension service delivery to their clientele. This is further buttressed during an IDI with extension supervisors from other organisations that are non-public that:

“Consistent exposure to ICT trainings will inform the difference exhibited in knowledge levels between respondents categorised under public and non-public organisations. Deliberate measures are set out to ensure all the extension personnel in our organisations are regularly upgraded on their knowledge of ICTs so that they can effectively utilise it in their disseminating activities”. (a senior personnel from human resource development, BAT, Iseyin Oyo State)

Table 4.2a: Distribution of respondents by knowledge in the use of ICTs for extension delivery activities

Knowledge items	Correct answers		
	Frequency	Percentage	Rank
Computer can be used for the following except (virus processing)	153	92.7	1 st
Which of the following is not used as a component of a computer system? (fax)	152	92.1	2 nd
Scanner can be used to scan the following except (audio)	141	85.5	3 rd
A scanner can scan documents that are only in black and white (no)	141	85.5	3 rd
Scanner is an input device of a computer system (true)	134	81.2	5 th
The efficiency of having a well recorded message using a tape recorder involves noise reduction by fine tuning the volume moderately (yes)	131	79.4	6 th
You can go to any of the following to download extra application for phone except (market store)	130	78.8	7 th
A tape recorder can easily record any message with ease by pressing the play button and record button simultaneously (yes)	127	77.0	8 th
A tape recorder can be powered by using any of these except (ultimate power)	127	77.0	8 th
Common frequencies used in radios include all but one of the following (AF)	119	72.1	10 th
When sending electronic mails out, what do you click? (compose)	118	71.5	11 th
Image quality of a camera is measured in (pixel)	117	70.9	12 th
When sending e-mail to people and you want to copy others as well that are not part of your recipients but wish to notify them, which of these do you click? (Cc)	106	64.2	14 th
The following can replace the work of a CD rom in a computer except (joystick)	104	63.0	15 th
All of these are internet search engines except (outlook)	99	60	16 th
The following affects the size of the projected image (all of the above)	98	59.4	17 th
One of the following is used as a smart TV platform (android)	95	57.6	18 th
The following are used as input devices in a computer system except (monitor)	92	55.8	19 th
Intercom equipment are usually powered (centrally)	91	55.2	20 th
Credit card can be loaded on the intercom (no)	91	55.2	20 th
The following cables can be used in connecting a projector to a source (all of the above)	90	54.5	22 nd

Source: Field work(2017)

Table 4.2b: Distribution of respondents by knowledge in the use of ICTs for extension delivery activities

Knowledge items	Correct answers		
	Frequency	Percentage	Rank
Intercoms are usually used for communication within the following spectrum (intra-organisations)	90	54.5	22 nd
The following are examples of social media apps popularly used for information dissemination except (LinkedIn)	89	53.9	24 th
The projector can be used to magnify the following except (audio)	86	52.1	25 th
Unwanted malicious email are usually located in which folders (spam folder)	86	52.1	25 th
The following can be done to improve the picture and sound quality of scrambled TV channels (all of the above)	84	50.9	27 th
Which of the following is not a popular social network technique used for spreading information on the internet (viewing)	83	50.3	28 th
Radio knob is used for the following (tuning to desired frequency)	78	47.3	29 th
The fax machine can only be used to send documents within an organization (true)	77	46.7	30 th
Which of the following computer device cannot be used to save video file (CD rom)	72	43.6	\
Radio dial and knob are one and the same (no)	69	41.8	31 st
A fax machine does the following except (telephone line)	66	40.0	32 nd
Mobile phone operating system include the following except (tablet)	65	39.4	33 rd
Which of the following is not a video format (MP3)	65	39.4	34 th
Video contains the following data except (none of the above)	58	35.2	34 th
What do you do to make an object to be captured larger when using a camera (zoom in)	55	33.3	36 th
What do you do to make the object to be captured smaller when using a camera? (zoom out)	53	32.1	37 th
A fax machine uses one of the following component to transmit documents (true)	46	27.9	38 th
CD rom can be used for all of these except (none of the above)	41	24.8	39 th
You can tune to a channel using the following menu function except (press quick on the remote control)	40	24.2	40 th
One of the following easily corrupts a CD rom (sharp objects)	17	10.3	41 st
			42 nd

Source: Field work(2017)

Table 4.2.1: Pooled knowledge level of practitioners in the use of ICTs for extension delivery activities

Characteristics	Category	Frequency	Percentage	Min. score	Max. score	Mean
	Low	75	45.5	8.0	35.0	23.60±5.29
	High	90	54.5			

Source: Field work(2017)

Table 4.2.2: Disaggregated knowledge level on the use of ICTs between public extension practitioners and extension practitioners from non-public organisations

	Category	Frequency	Percentage	Min. score	Max. score	Mean
Public	Low	62	50.0	8.0	33.0	23.21±5.26
	High	62	50.0			
Non-public	Low	13	31.7	12.0	35.0	24.78±5.29
	High	28	68.3			

Source: Field work(2017)

4.3: Available ICT tools for extension practitioners in South-western Nigeria

The distribution on Table 4.3 showed the ICT tools that were available to most of the respondents include: mobile phone (98.2%), computer (91.5%), e-mail (91.5%) and camera (90.3%) while the least available ICT tool was fax machine (3.6%). This finding projects mobile phone as the most available tool which serves the need of the respondents to fulfil their roles as extension practitioners. This shows that mobile phone is a good platform to disseminate information to the clientele. The e-wallet system which emphasised the use of mobile phones in communicating with farmers has shown that extension practitioners has a basis for availability of mobile phones in reaching out to their clientele (Jaji, Abanigbe and Abass, 2017). This finding is in line with Gumah, Obeng and Mustapha (2016); which revealed that mobile phone was the most available tool for extension officers in discharging their extension duties in the study area. This suggests the suitability of mobile phone for effective extension service delivery in the study area.

Furthermore, respondents' level of available ICT tools on Table 4.3.1 shows that it is categorised as high with the distribution of 65.5% and mean of 9.82 ± 2.35 . This support the findings of Gumah et al, (2016) that most of the ICT tools used by extension personnel are those tools that are quite conversant with their clientele and are relatively available for their disseminating activities to their target beneficiaries. This implies that quite a reasonable number of ICT tools tend to be readily available for their disseminating activities in order to enhance effective communication between extension service providers and their clients.

The study further categorised the respondents into public organisation and non-public organisations. Findings from Table 4.3.2 show the level of available ICT tools between extension practitioners from public organisation and respondents from non-public organisations in the use of ICTs. Majority of respondents (61.3%) from public organisation fell within those with high level of availability of ICT tools, while 38.7% fell within those with low level of available ICT tools. On the other hand, 78.0% of respondents from non-public organisations fell within those with high level of available ICT tools, while 22.0% of respondents fell within low level of available ICT tools. This finding is further buttressed by an IDI report;

‘ICT tools are fully supplied by our financiers and organisational management in order to carry out our extension obligations sumptuously without any reservation towards our clientele’(a senior personnel from human resource development, BAT, Iseyin).

Table 4.3: Distribution of respondents by ICT tools available for their extension activities

ICT tools	Frequency	Percentage	Rank
Mobile phone	162	98.2	1 st
Computer	151	91.5	2 nd
E mail	151	91.5	2 nd
Camera	149	90.3	4 th
Projectors	140	84.8	5 th
TV	139	84.2	6 th
Video	138	83.6	7 th
Radio	137	83.0	8 th
Internet	118	71.5	9 th
CD ROM	111	67.3	10 th
Tape recorder	109	66.1	11 th
Scanner	83	50.3	12 th
Intercom	26	15.8	13 th
Fax machine	6	3.6	14 th

Source: Field work(2017)

Table 4.3.1: Pooled Level of availability of ICT tools among respondents in their extension activities

Category	Frequency	Percentage	Min. score	Max. score	Mean
Low	57	34.5	1.00	14.00	9.82±2.35
High	108	65.5			

Source: Field work(2017)

Table 4.3.2: Disaggregated Level of availability of ICT tools among respondents from Public organisations and non-public organisations

Organisation	Category	Frequency	Percentage	Minimum	Maximum	Mean
Public	Low	48	38.70	1.00	14.00	9.53±2.41
	High	76	61.30			
Non-public	Low	9	22.00	6.00	14.00	10.68±1.93
	High	32	78.00			

Source: Field work(2017)

4.4: ICT tools accessible to extension practitioners

The distribution of the extension practitioners' responses shown in Table 4.4 revealed the order at which they had access to ICT tools with their weighted mean score as mobile phone (2.54), camera (1.47) and radio (1.39). This suggests that the respondents' access to mobile phone and radio may be as a result of its wide applicability in getting relevant information across to their clientele. This further shows that respondents' access to camera may give them opportunity of getting clearer illustrations of things to be disseminated to their clienteles easily. This finding is in line with Yakubu *et al* (2013), who revealed that mobile phone, camera and radio were mainly accessible among other ICT tools in transferring agricultural information to farmers. This finding further suggests that these communication tools have great potentials for use in development communication in the study area. This will consequently enhance the rate of knowledge transfer on recent production technologies to farmers thereby resulting in greater extension delivery impact to their target audience.

Moreover, respondents' level of access of communication tools on Table 4.4.1 shows that it was categorised as low with the distribution of 51.2% and mean of 15.2±5. This support the findings of Cynthia and Nwabugwu (2016), who established that most relevant communication tools had minimal accessibility level in a study on adoption of communication tools by agricultural extension personnel. From the foregoing it is obvious that lack of adequate access to these important communication tools poses a threat to its optimum utilisation for agricultural extension service delivery. This shows that extension practitioners tend to be limited in passing vital agricultural-related information to farmers, which could have enhance their clientele's production if access to using these tools is unhindered.

The study further categorised the respondents into those of public organisation and non-public organisations. Findings from Table 4.4.2 show the level of access in the use of ICTs between extension practitioners from public organisation and respondents from non-public organisations in the use of ICTs. A greater proportion of respondents (60.5%) from public organisation fell within those with high level of access to ICT use, while 39.5% fell within those with low level of access in the use of ICT. On the other hand, 73.2% of respondents from non-public organisations fell within those with high

level of access in the use of ICT, while 26.8% of respondents fell within low level of access on ICT use. This finding is supported during an IDI who report:

“there are well guided policies that has been put in place by the organisational management that ensures consistent and uninterrupted access to ICT utilisation by all members of staff in order to make the extension service delivery to our clientele much more proficient” (thehead of integrated development program in JDPC, Ibadan

This implies that access to ICTs is relatively easier at the non-public organisations (BAT, JDPC and USAID) but difficult at the public organisation. It shows that the more accessible these ICT tools are to extension practitioners from various organisations, the greater will be its utilisation for extension delivery purposes.

Table 4.4: Distribution of respondents by ICT tools accessible for their extension activities, n=165

ICT tools	Very accessible	Rarely accessible	Not accessible	Weighted mean	Rank
Mobile phone	90.3	7.3	1.8	2.54	1 st
Camera	60.0	27.3	12.7	1.47	2 nd
Radio	55.2	29.1	15.8	1.39	3 rd
Computer	41.8	49.7	8.5	1.33	4 th
E mail	44.8	43.6	11.5	1.33	4 th
T.V	43.0	41.2	15.8	1.27	6 th
Video	35.2	46.7	18.2	1.17	6 th
Projectors	32.1	51.5	16.4	1.16	8 th
Internet	36.4	40.0	23.6	1.13	9 th
Tape recorder	30.3	36.4	33.3	0.97	10 th
Cd –Rom	24.2	43.0	32.7	0.92	11 th
Scanner	21.2	27.9	50.9	0.70	12 th
Intercom	11.5	8.5	80.0	0.32	13 th
Fax machine	2.4	5.5	92.1	0.10	14 th

Source: Field work(2017)

Table 4.4.1:Pooled Level of access of information and communication tools

Category	Frequency	Percentage	Min. score	Max. score	Mean
Low	86	52.1	1.0	27.0	15.2±5.0
High	79	47.9			

Source: Field work(2017)

Table 4.4.2: Disaggregated Level of access in the use of ICT between public extension practitioners and extension practitioners from non-public organisations

Organisation	Category	Frequency	Percentage	Minimum	Maximum	Mean
Public	Low	75	60.5	1.0	24.0	13.99±4.62
	High	49	39.5			
Non-public	Low	11	26.8	5.00	27.00	18.73±5.43
	High	30	73.2			

Source: Field work(2017)

4.5: Utilisation of ICT tools in relation to frequency of use

Table 4.5 presents the order of utilisation of ICT tools using the weighted mean score as follows: mobile phone (4.79), radio (3.47), internet (3.39) and computer (3.27). This shows that mobile phone tends to be frequently used most by the respondents for dissemination and information gathering extension activities. This is followed by radio. The frequent use of mobile phone and radio by respondents could be as a result of the availability and accessibility of these tools in communicating information to their clientele. This finding is in tandem with Gumah *et al* (2016), who opined that phone and radio are the most frequently used communication tools by extension personnel. The implication of this finding is that mobile phone and radio are relevant and dynamic ICT tools for extension practitioners' involvement in extension activities.

Also, findings from Table 4.5.1 give a summary of respondents' level of use of ICT tools as low with the distribution of 70.9% and mean of 93.55 ± 80 . This finding is in consonance with the submission of Islam, Haque, Afrad, Abdullah and Hoque (2017), who found that most agricultural extension personnel were categorised under low utilisation of technological tools. This suggests that most extension practitioners in this study area are not optimising other ICT tools as much as they do with phone and radio in their extension duties.

Respondents were further categorised under two classes which are extension practitioners from public organisation and those from non-public organisations. Result in Table 4.5.2 shows that 82.3% of respondents from public organisation fell within those with low level of use of ICT tools, while 17.7% of respondents from public organisation fell within those with high level of use of ICT tools. Alternatively, 63.4% of respondents from non-public organisations fell within those with high level of use of ICT tools, while 36.6% of respondents from public organisation fell within those with low level of use of ICT tools. This shows that extension practitioners from public organisation exhibit low use of ICT tools probably because they have few available tools with minimum access to use this tool from their organisation. This is in line with the IDI report:

‘presently we concentrate on ICT tools that are readily available and accessible for use in our organisation. This is as a result of inconsistency in financial support from the government in equipping the ICT sector of the

organisation with relevant tools, thereby reducing the utilisation of these tools in our extension service delivery to farmers (a subject matter specialist in animal production, ADP, Ekiti)

Table 4.5: Distribution of respondents by frequency of utilisation of ICT tools, n=165

ICT Tools	Always	Near always	Sometimes	Near sometimes	Rarely	Never	Weighted mean
Mobile phone	83.0	13.3	3.0	0.6	0.0	0.0	4.79
Radio	33.3	20.0	26.7	9.7	0.6	9.7	3.47
Internet	33.9	21.2	25.5	4.2	0.0	15.2	3.39
Computer	30.3	18.8	30.9	3.6	0.6	15.8	3.27
Camera	26.1	24.2	29.7	0.6	1.8	17.6	3.19
E mail	20.6	15.8	32.1	4.8	3.0	23.6	2.75
Television	13.3	10.9	18.8	27.3	6.1	23.6	2.27
Video	11.5	12.7	4.8	24.2	24.8	21.8	1.96
Audio recorder	4.8	10.3	17.0	11.5	21.2	35.2	1.60
Projector	2.4	6.1	14.5	21.8	22.2	32.7	1.46
Cd rom	6.1	6.1	11.5	6.70	19.40	50.30	1.22
Scanner	1.8	6.7	9.1	9.7	6.1	66.7	0.88
Intercom	3.6	2.4	5.5	1.2	1.2	86.1	0.48
Fax	0.6	0.6	2.4	0.0	0.0	96.4	0.13

Source: Field work (2017)

*where always = about 25 days in a month, sometimes = about 17 days in a month, rarely = about 10 days in a month and never represents not at all

Table 4.5.1: Pooled Level of use of ICT tools

Category	Frequency	Percentage	Min. score	Max. score	Mean
Low	117	70.9	5.1	443.0	93.55±80.0
High	48	29.1			

Source: Field work (2017)

Table 4.5.2: Disaggregated Level of utilisation of ICT tools between public extension practitioners and extension practitioners from non-public organisations

Organisation	Category	Frequency	Percentage	Min. score	Max. score	Mean
Public	Low	102	82.3	5.0	62.0	29.65±11.10
	High	22	17.7			
Non-public	Low	15	36.6	5.0	62.0	34.80±11.45
	High	26	63.4			

Source: Field work(2017)

4.6: Respondents' Perceptions on relevance of ICT tools to extension activities

Result in Table 4.6 reveals each of the statement describing the relevance of a tool in the extension activities. The order of relevance of ICT tools for respondents' extension activities is as shown using the weighted mean score as follow: using mobile phone to raise general awareness of opportunities in extension work (2.75), using radios in linking farmers to markets (2.65), using digital camera in getting important images relating to agriculture (2.64). This reveals that mobile phones and radio are the most relevant ICT tools in the study area, because they are readily available and accessible tools for their extension work. However, fax was least relevant ICT tool due to its non-availability and non-accessibility to the respondents for their official duties. The implication of these findings to the study reveals that mobile phones and radios are very germane that is, enhances faster diffusion and delivery of agricultural information and messages to farmers by extension practitioners in their disseminating activities. This finding is in line with the work of Olanrewaju, Farinde and Oloyede (2017) who found out that the use of mobile phones and radio has a greater impact in the dissemination of agricultural messages by extension personnel. This will help in sustaining the interest of its users due to the authenticity of the information sent through these ICT platforms.

Respondents were further categorised under two classes which are extension practitioners from public organisation and those from non-public organisations. Result in Table 4.6.1 shows that 44.40% of respondents from public organisation fell within those with low level of relevance of ICT tools, while 55.60% of respondents from public organisation fell within those with high level of relevance of ICT tools. Alternatively, 61.00% of respondents from non-public organisations fell within those with high level of relevance of ICT tools, while 39.00% of respondents from public organisation fell within those with low level of relevance of ICT tools. This shows that extension practitioners from public organisation exhibited lower relevance of ICT tools for their extension work probably due to the fact that they have limited access to the few tools available in carrying out their extension duties from their organisation thereby affecting the rate of use of these tools in their work. It can also be deduced that extension practitioners from non-public organisations have greater edge in using the relevant tools they have better

access to more frequently than respondents from public organisations (Olanrewaju *et al*, 2017).

Table 4.6a: Distribution of respondents by the relevance of ICT tools to their extension activities, n=165

Statements on Relevance of ICT tools	Very Relevant (%)	Somehow Relevant (%)	Not Relevant (%)	Weighted mean	Rank
Using mobile phone in raising general awareness of opportunities	78.8	17.0	4.2	2.75	1 st
Using radio in facilitating access to credits and inputs	69.1	27.3	3.6	2.65	2 nd
Using radios in linking farmers to markets	70.3	24.8	4.8	2.65	2 nd
Using digital camera in getting important images relating to agriculture	69.7	24.8	5.5	2.64	4 th
Using mobile phones in facilitating access to credits & inputs	66.7	27.9	5.5	2.61	5 th
Using mobile phones in conducting surveys, enumerations, monitoring & evaluation	64.2	32.1	3.6	2.60	6 th
Using video in training farmers	65.5	29.1	5.5	2.60	6 th
Using projector in providing mass advisories for extension delivery	64.2	28.5	7.3	2.60	6 th
Using radio in providing technical information on demonstration training to farmers	67.3	24.8	7.9	2.59	9 th
Using T.V in providing mass advisories	62.4	30.3	6.7	2.55	10 th
Using T.V in demonstration shows for farmers	61.2	32.7	6.1	2.55	10 th
Using video in raising general awareness of opportunities in agriculture	62.4	29.7	7.9	2.55	10 th
Using computer in providing technical information	61.2	30.9	7.9	2.53	13 th
Using e-mail in sending messages, links, documents and attachments for extension delivery purpose	58.2	31.5	10.3	2.48	14 th
Using videos in linking farmers to market	56.4	34.5	9.1	2.47	15 th
Using internet in raising general awareness of agricultural related opportunities	60.0	26.7	13.3	2.47	15 th
Using T.V. in responding to follow up questions	55.8	34.5	19.7	2.46	17 th

Source: Field work (2017)

Table 4.6b: Distribution of respondents by the relevance of ICT tools to their extension activities, n=165

Statements on Relevance of ICT tools	Very Relevant (%)	Somehow Relevant (%)	Not Relevant (%)	Weighted mean	Rank
Using videos in diagnosing problems and recommending a solution	51.5	41.2	7.3	2.44	18 th
Using tape recorder in raising general awareness of opportunities to farmers for extension delivery	53.9	34.5	11.5	2.42	19 th
Using internet in providing mass advisories	50.9	37.0	12.1	2.39	20 th
Using CD -ROM in storing data in form of text, graphic & sound for extension delivery purpose	54.2	28.5	17.0	2.38	21 st
Using scanners in transferring images from books/photographs into digital format computer can read for extension purposes	47.3	35.8	17.0	2.30	22 nd
Using intercom in communicating & receiving feedback from receiver to audience for extension delivery	39.4	40.0	20.6	2.19	23 rd
Using fax in assisting with business planning	23.6	41.8	34.5	1.89	24 th
Using fax in diagnosing problems & recommending solution	21.8	38.8	39.4	1.82	25 th

Source: Field work (2017)

Table 4.6.1: Disaggregated Level of relevance of ICT tools among respondents from public and non-public organisations

Organisation	Category	Frequency	Percentage	Min. score	Max. score	Mean
Public	Low	55	44.40	31.0	77.0	61.66±8.48
	High	69	55.60			
Non-public	Low	16	39.00	28.0	73.0	61.85±9.49
	High	25	61.00			

Source: Field work (2017)

4.7: Extension delivery strategies used by extension practitioners

Extension strategies used were classified organisation by organisation. Results from Table 4.7 show that for British American Tobacco (BAT) organisation, “Farmers Field School, demonstration plots and individual follow” up had a weighted score of 300, with other three extension strategies which include “lead farmers and specialised training” (300), “on farm trials” (300), “field days” (300) were mostly used. While “on-research station workshop” had a weighted score of 280 and was the least strategy used in this organisation. This suggests that extension practitioners from British American Tobacco (BAT) engage in multi-dimensional approach in the use of extension strategies for their extension service delivery. This has assisted them in rendering super-effective extension service to their clientele. The least used strategy may have been as a result of non-compatibility of the agro-ecological workshop environment with that of the farmers’ farm or lack of suitable resources to activate such on farmers’ farm. ‘Strategic Annual Report from BAT’, (2015) asserts that extension delivery strategies used mostly by extension personnel encompasses those strategies that mobilises farmers together as a group in order to enhance the rate of diffusion, adoption and sustainability of agricultural innovations disseminated to the farmers.

Results from Table 4.7.1 show that for Justice Development and Peace Commission (JDPC) organisation, Training and Visit strategy was used most with a weighted score of 295.2. The least used strategy had a weighted score of 190.6 which is on research workshop. This suggests that this age-long strategy is still strongly adopted by extension practitioners from JDPC so as to ensure mutual and sustained relationships between the service providers and their clientele. This tends to assist in rendering qualitative extension service delivery to the recipients. This finding support the outcome of JDPC Annual Report, (2015) which emphasised that farm visits were made on consistent basis in order to impact farmers by supervising them in taking sound decisions in relation to their various agricultural enterprises, as well as assist in tackling problems encountered by farmers on the field.

Results from Table 4.7.2 show that for Agricultural Development Programme (ADP) organisation, “farmers’ field school, demonstration plots and individual follow up” was the most used extension strategy with a weighted mean score of 275.8; while the

least used strategy was credit schemes and saving initiative (221.8). This suggests that extension practitioners from this organisation prefer to use the participatory group technique in actualising effective extension service by training local farmers through this strategy. The least used strategy may have risen as a result of non-eligibility of beneficiaries in meeting the financial standards or obligations of financial institutions in securing a loan from such. This finding confirms the work of Azumah, Donkoh and Awuni (2018), who found out that ‘farmer field school, demonstration plot and individual follow up were the most extension strategies used by extension personnel under the public extension agency in reaching out to their clients for excellent extension service delivery.

Also results from Table 4.7.3 show that for United States Agency for International Development (USAID), the extension strategy used most is farmers’ field school, demonstration plots and individual follow up with a weighted score of 260, while the extension strategy least used is value chain and market integration with a weighted score of (150). This suggests that extension practitioners from this organisation tend to use this strategy in order to deepen farmers understanding on various agronomic practices through participatory trainings. The least used strategy may have risen as a result of dearth of workers to integrate and facilitate farmers efficiently into market as well as input access. This finding is in line with USAID, (2017) which accentuate the involvement of this international agency with extension personnel from Agricultural Development Programmes (ADPs) in employing strategies like demonstration plots, farmers’ field school with follow up schemes. These strategies have been put in place in some selected states in the country in order to equip their clientele with relevant information and trainings on agricultural innovations

Result from Table 4.7.4 reveals the extension strategies used most across the four organisations by extension practitioners as “Farmer Field Schools, Demonstration plots and Individual follow up” with a weighted score of 275.8, while the extension strategies used least are both “on research station workshop” and “credit scheme and saving initiative” with weighted score of 234 each. This shows that generally across the four organisations used for purpose of this study, farmer field schools, demonstration plots and individual follow up is the most employed strategy. This establishes that most of the

relevant strategies employed by extension practitioners in this study are participatory in nature with the target beneficiaries as active participants in acquiring the necessary skills, training and education from each of these extension related strategies. As a result, this makes those strategies prone to be more effective in assisting extension practitioners to developing a working relationship with the farmers that are meant to benefit from their extension dissemination activities (Vignare, 2013). However it is noted that these delivery strategies like credit schemes and saving initiative as well as on-research station workshop were not largely employed by the extension practitioners probably due to bureaucratic process involved in securing loan from the government as well as non-adaptability of most on-research station workshop to most farmers' ecological environment.

The overall statistics of the respondents extension delivery strategies used based on the four various organisations are BAT ($\bar{x} = 252.18 \pm 90.92$); JDPC ($\bar{x} = 174.07 \pm 108.89$); ADP ($\bar{x} = 70.58 \pm 47.00$); USAID ($\bar{x} = 50.74 \pm 23.39$).

Table 4.7: Distribution of respondents by extension delivery strategies used in British American Tobacco (BAT) Organisation

Strategies	Always	Weighted score
Farmers Field School, demonstration plots & Individual follow up	100	300
Training and visit	100	300
Lead farmers & specialised training	100	300
On-farm trials	100	300
Field days	100	300
Value chain & market integration	90.0	290
Credit schemes & saving initiative	90.0	290
Group extension methodologies	90.0	290
On research station workshop	90.0	290

Source: Field work (2017)

*NB: Response options with no or negligible values have been excluded from the table.

Table4.7.1: Distribution of respondents' by extension delivery strategies used in Justice Development and Peace Commission (JDPC) Organisation

Strategies	Always	Sometimes	Weighted Score
Training and visit	95.2	4.8	295.2
Credit schemes & saving initiative	90.5	9.5	290.5
Value chain & market integration	81.0	19.0	281
Lead farmers & specialised training	85.7	9.5	280.9
Farmers Field School, demonstration plots & individual follow up	71.4	28.6	271.4
On farm trials	71.4	28.6	271.4
Group extension methodologies	61.9	33.3	257.1
Field days	71.4	14.3	257.1
On-research station workshop	28.6	38.1	190.6

Source: Field work (2017)

*NB: Response options with no or negligible values have been excluded from the table.

Table4.7.2: Distribution of respondents' by extension delivery strategies used in Agricultural Development Programme (ADP) Organisation

Strategies	Always	Sometimes	Rarely	Never	Weighted score
Farmers Field School, demonstration plots & individual follow up	76.6	22.6	0.8	0	275.8
Training and visit	76.6	18.5	3.2	1.6	270
Group extension methodologies	74.2	21.8	2.4	1.6	268.6
On farm trials	70.2	21.8	5.6	2.4	259.8
Lead farmers & specialised training	62.1	33.9	2.4	1.6	256.5
Field days	63.7	27.4	6.5	2.4	252.4
On-research station workshop	48.4	45.2	5.6	0.8	241.2
Value chain & market integration	47.6	45.2	6.5	0.8	239.7
Credit schemes & saving initiative	35.5	52.4	10.5	1.6	221.8

Source: Field work(2017)

Table4.7.3: Distribution of respondents’ by extension delivery strategies used in organisation – United State Agency for International Development (USAID) Organisation

Strategies	Always	Sometimes	Rarely	Never	Weighted score
Farmers Field School, demonstration plots & individual follow up	60.0	40.0	0	0	260
Training and visit	60.0	20.0	10.0	10.0	230
Credit schemes & saving initiative	40.0	40.0	10.0	10.0	210
On farm trials	50.0	20.0	20.0	10.0	210
Lead farmers & specialised training	40.0	40.0	10.0	10.0	210
Field days	40.0	30.0	20.0	10.0	200
On research station workshop	40.0	30.0	10.0	20.0	190
Group extension methodologies	30.0	20.0	20.0	20.0	160
Value chain & market integration	30.0	20.0	30.0	30.0	150

Source: Field work(2017)

Table4.7.4: Distribution of respondents' by extension delivery strategies used across the four organisations

Strategies	Always	Sometimes	Rarely	Never	Weighted score
Farmers Field School, demonstration plots& individual follow up	76.4	23.0	0.6	0	275.8
Training and visit	79.4	15.8	3.0	1.8	272.8
Group methodologies	70.9	22.4	4.2	2.4	261.7
Lead farmers & specialised training	66.1	29.1	3.0	1.8	259.5
On farm trials	70.9	21.2	5.5	2.4	260.6
Field days	65.5	24.2	7.9	2.4	252.8
Value chain and market integration	53.3	38.2	6.1	2.4	242.4
Credit schemes & saving initiative	46.1	43.6	8.5	1.8	234
On-research station workshop	47.9	40.6	9.1	2.4	234

Source: Field work (2017)

4.8: Perceptions to the use of ICT tools for extension activities

As indicated from Table 4.8, more than half of the respondents (57.6%) strongly agreed that relevant information can be got through the use of video and also 35.2% did agree as well that relevant information can be got through the use of video. Also, 52.7% of the respondents strongly agreed that the use of ICT tools for extension delivery use improve linkages between research and extension, equally 33.9% of the respondents did agreed that the use of information and communication tools for extension delivery use improve linkages between research and extension. Concurrently, 52.7% of the respondents strongly agreed that extension delivery using ICT tools helps in raising general awareness of opportunities available to farmers, also 35.8% of the respondents did agreed that extension delivery using ICT tools helps in raising general awareness of opportunities available to farmers.

Moreover, 46.7% of extension practitioners strongly agreed that information and communication technology use could make agricultural extension message delivery become more effective to farmers, similarly 40.0% also did agreed that information and communication technology use could make agricultural extension message delivery become more effective to farmers. This result is an indication that the extension practitioners' perception on the use of information and communication technology is positively inclined which can definitely be a strong enhancement to the respondent efficient extension delivery activities. This implies that extension workers better perception on technology usage may have risen due to the higher knowledge of communication tools they have acquired on the use of information and communication tools (Ajayi *et al*, 2013).

Meanwhile, 46.1% of the respondents' agreed that use of information and communication tools among various extension organisations promotes competition, also 43.0% of the respondents also agreed that extension delivery using information and communication tools helps in facilitating access to credits and inputs by farmers. This infers that respondents' use of ICT tools will act as a catalyst in duplicating information dissemination capacity of their various extension activities.

Overall disposition of extension practitioners' perception from Table 4.8.1 suggests a favourable perception proportion of 52.1%. This reflects that the respondents

had a positive perceptive disposition to information and communication technology use for their extension activities.

Cynthia and Nwabugwu (2016), asserted the favourable disposition of extension personnel to usage of ICT tools in enhancing their extension service delivery to their clientele.

The study further categorised respondents into those of public organisation and non-public organisations. Findings from Table 4.8.2 revealed the perception level between public extension practitioners and extension practitioners from non-public organisations in the use of ICTs. In public organisation, 50.8% of respondents had unfavourable perception, while 49.2% fell within favourable perception towards the use of ICT tools for extension activities. Whereas 61.0% of respondents from non-public organisations fell within those with favourable perception level, while 39.0% of respondents fell within those with unfavourable perception level of ICTs. This implies that a greater proportion of extension practitioners from the non-public organisations (BAT, JDPC and USAID) exhibited higher degree of perception on ICT use, while a lower proportion of extension practitioners from the public organisation exhibited favourable perception level of ICT use. This implies that respondents from the non-public organisations favourable perception could have risen as a result of frequent exposure to trainings on ICT use within their organisations which pre-empt them to having a greater disposition to using these tools in their extension work. This is further buttressed during an IDI with extension supervisors from other organisation that are non-public:

“Consistent exposure to ICT trainings clearly informs the difference exhibited in perception levels between respondents categorised under public and non-public organisations. Deliberate measures are set out to ensure all the extension personnel in our organisations are regularly upgraded on their perception level through thorough enlightenment training programmes on ICTs so that they can effectively utilise it in their disseminating activities”. (a senior personnel for human resource development, BAT, Iseyin)

Table 4.8a: Perceptions to the Use of ICT tools for Extension Activities

Perception Statements	SA	A	U	D	SD
Relevant information can be gotten through the use of video	57.6	35.2	3.6	2.4	1.2
Extension work can be slowed down if internet are not easily accessible	37.6	34.5	9.1	13.9	4.8
The use of camera in extension work does not provide full information on agricultural messages	19.4	40.0	9.7	20.6	10.3
Use of radio in extension delivery is not educative	17.0	8.5	8.5	29.7	36.4
Use of ICT tools among various extension organisations promotes competition	29.1	46.1	10.9	7.3	6.7
Use of ICT tools for extension delivery use improve linkages between research and extension	52.7	33.9	9.7	1.2	2.4
The use of ICT tools does not help in diagnosing problems of farmers	13.3	17.6	10.3	33.9	24.8
Use of ICT tools does not assist in recommending a solution to farmers' problems	18.2	13.9	7.9	35.8	24.2
Use of ICT tools allows response to follow up questions raised by farmers	35.8	37.0	12.7	7.9	6.7
Extension delivery using ICT tools helps in facilitating access to credits and inputs by farmers	28.5	43.0	17.6	10.3	0.6
Extension delivery using ICT tools helps in raising general awareness of opportunities available to farmers	52.7	35.8	7.9	3.0	0.6
Use of ICT tools for extension delivery could lead to poor capacity building among extension organisations	11.5	10.9	13.3	30.3	33.9
Use of ICT tools in extension work can never increase priority areas of extension coverage	12.1	19.4	7.3	42.4	18.8
Use of ICT tools discourages extension services to be directed at specific needs of the people	13.3	15.8	13.3	38.8	18.8
The use of ICT tools for extension delivery could be complicated in its operational use while delivering agricultural related messages to farmers	13.3	31.5	11.5	29.7	13.9
ICT use could make agricultural extension message delivery become more effective to farmers	46.7	40.0	6.1	5.5	1.8
Use of ICT tools for extension delivery could lead to slow rate of adoption of agricultural messages	17.6	18.2	10.3	43.6	14.5

Source: Field work (2017)

Table 4.8b: Perceptions to the Use of ICT tools for Extension Activities

Perception Statements	SA	A	U	D	SD
The use of ICT tools for training farmers in extension delivery does not provide adequate advisory support	13.3	18.2	10.3	43.6	14.5
Use of ICT tools in extension work reduces the participation of extension personnel	23.0	17.6	10.9	34.5	13.9
Use of ICT tools for extension work will break gender restriction in receiving agricultural messages	27.9	37.0	9.7	19.4	6.1
Empowerment of extension organisations and farmers is not enabled through the use of ICT tools	21.2	15.8	12.1	33.3	17.6
Timely information are not obtainable to farmers through the use of ICT tools for extension delivery	13.9	22.4	13.9	30.3	19.4
The quantity of agricultural messages that can be passed to farmers through the use of ICT tools is very limited	11.5	29.1	9.1	34.5	15.8
The quality of agricultural information that can be passed to farmers cannot be readily accessible to farmers through the use of ICT tools	10.9	27.3	17.0	27.9	17.0

Source: Field work (2017)

Table 4.8.1: Pooled Perception level on use of ICT tools for extension activities

Perception	Frequency	Percentage	Index	Min. score	Max. score	Mean/SD
Unfavourable	79	47.9		51.0	104.0	79.206±13.0
Favourable	86	52.1				
Total	165	100.0				

Source: Field work (2017)

Table 4.8.2: Disaggregated Perception level of extension practitioners on use of ICT tools in public and non-public organisations

Organisation	Category	Frequency	Percentage	Min. score	Max. score	Mean
Public	Unfavourable	63	50.8	56.0	104.0	74.35±12.44
	Favourable	61	49.2			
Non-public	Unfavourable	16	39.0	46.0	101.0	68.76±13.77
	Favourable	25	61.0			

Source: Field work(2017)

4.9: Constraints to access of ICT tools

Data from Table 4.9 displays the major constraints to the respondents' information and communication technology access in their extension duties as interrupted power supply ($\bar{x}=1.83$), followed by lack of financial resources ($\bar{x}=1.64$), while others are lack of relevant infrastructure ($\bar{x}=1.50$), lack of internet facilities ($\bar{x}=1.47$) and high cost of hardware ($\bar{x}= 1.45$). Interrupted power supply was the most severe constraint that limits the respondents' access to communication tools for extension service delivery. It has been observed that majority of the extension organisations lack alternate or backup power supply apart from that of the government power supply provision. This majorly constitute a huge hindrance in having access to powering up their communication tools for excellent performance of their extension duties. This finding is in consonance with Cynthia *et al*(2016) who also emphasised unstable power supply as one of the prominent constraints to accessing communication technologies.

Also, from the distribution shown on Table 4.9, it is noted that lack of financial resources in acquiring highly-performing and up to date information communication tools and infrastructures in extension organisations also hampers the extension' practitioners access to these communication tools. It is also noted that lack of locally relevant content and acceptable usage policy poses a lesser effect on the respondents' access to communication tools. This finding is at variance with Olaniyi *et al* (2013) which stated lack of internet facilities as the most severe constraints in having access to information communication tools by extension organisations.

Moreover, the study categorised respondents into those of public and non-public extension organisations. Findings from Table 4.9.1 revealed the level of constraints to access between extension practitioners from public and non-public organisations in the use of ICTs. 35.50% of respondents from public organisation fell within those with low level of constraints to ICT access, while 64.50% fell within high level of constraint to ICT access. Whereas 75.60% of respondents from non-public organisations fell within those with low level of constraints to ICT access, while 24.40% of respondents fell within those with high level of constraints to ICT access. This implies that a greater proportion of extension practitioners from the non-public organisations do encounter minimal constraints in accessing these ICTs in the course of rendering their extension duties to

their target beneficiaries. This could be as a result of provision of relevant infrastructural facilities by the management of their organisation in facilitating effective extension service delivery rendered by their personnel to the farmers. Furthermore, notable constraints to respondents' access to ICT tools were identified in for public and non-public organisations. Table 4.9.2 showed that interrupted power supply ($\bar{x}=1.92$) was the major constraint to respondents' access to ICT tools while acceptable usage policy ($\bar{x}=1.35$) was the least constraint faced by respondents from public organisation. This shows that interrupted power supply poses a great threat to accessing most of the ICT tools used by respondents in public extension organisations in the course of performing their extension duties. This finding supports the IDI report gathered from a senior extension officer in ADP:

“epileptic power supply constitute a major issue to accessing most of the available ICT tools in the organisation, as a result most of the extension activities are slowed down, as well as reducing personnel motivation to exploiting these ICT tools for extension purposes” (a senior personnel from ADP, from extension department, Ogun state).

Alternatively, notable constraints to respondents' access to ICT tools were identified in Table 4.9.3 for non-public organisation. Low financial resources ($\bar{x}=0.82$) was the major constraint to respondents access to ICT tools, while interrupted power supply ($\bar{x}=0.43$) was the least constraint to respondents' access to ICT tools. This reveals that respondents from non-public organisations experiences limitation to accessing ICT tools as a result of low financial resource in their extension work. This implies that their low financial resources could be explained when respondents' have exhausted the main amount of money allocated for disseminating extension information to clientele with the available ICT tools. While they seldom experience interrupted power supply in accessing these tools for their extension work. This is further buttressed from IDI report from BAT.

“sufficient financial resources are given to each personnel to facilitate effective extension service delivery to our clients. Most times access to these tools were inhibited if personnel had exhausted their allotted quota, which could result in low financial resource to access the tools at that point in time (a senior personnel at BAT from the human resource department, Oyo state).

Table 4.9: Constraints to access of ICT tools

Constraints	Serious constraints	Mild constraints	Not at all	Weighted Mean	Rank
Epileptic power supply	86.7	9.7	3.6	1.83	1 st
Inadequate financial resources	71.5	21.2	7.3	1.64	2 nd
Lack of relevant infrastructures	60.0	30.3	9.7	1.50	3 rd
Lack of internet facilities	56.4	34.5	9.1	1.47	4 th
High cost of hard ware	57.9	29.9	12.2	1.45	5 th
Lack of technology appropriateness	47.9	37.0	15.2	1.32	6 th
Non-affordability	45.5	37.6	17.0	1.28	7 th
Lack of locally relevant content	40.0	46.7	13.3	1.27	8 th
Acceptable usage policy	18.2	37.6	44.2	1.26	9 th

Source: Field work (2017)

Table 4.9.1: Disaggregated Level of constraints of respondents' access to ICT tools in public and non-public organisations

Organisation	Category	Frequency	Percentage	Min. score	Max. score	Mean
Public	Low	44	35.50	5.00	19.00	14.17±3.22
	High	80	64.50			
Non-public	Low	31	75.60	0.00	18.00	9.83±5.21
	High	10	24.40			

Source: Field work (2017)

Table 4.9.2: Constraints of respondents' access to ICT tools in public organisation

Constraints	Serious constraints	Mild constraints	Not at all	Weighted mean	Std.deviat ion	Rank
Interrupted power supply	91.90	8.10	0.00	1.92	0.46	1 st
Lack of financial resources	79.80	18.50	1.60	1.78	0.45	2 nd
Lack of internet facilities	64.50	33.10	2.40	1.62	0.53	3 rd
Lack of relevant infrastructures	65.30	31.50	3.20	1.62	0.55	3 rd
High cost of hardware	62.60	30.10	7.30	1.55	0.63	5 th
Lack of tech. appropriateness	54.0	37.90	8.10	1.46	0.64	6 th
Non-affordability	52.40	39.50	8.10	1.44	0.64	7 th
Lack of locally relevant content and services	47.60	41.90	10.50	1.37	0.67	8 th
Acceptable usage policy	48.40	37.90	13.70	1.35	0.71	9 th

Source: Field work (2017)

Table 4.9.3: Constraints of respondents' access to ICT tools in non-public organisations

Constraints	Serious constraints	Mild constraints	Not at all	Weighted mean	Std. deviation	Rank
Low financial resources	46.30	29.30	24.40	1.22	0.82	1 st
High cost of hardware	43.90	29.30	26.80	1.17	0.83	2 nd
Lack of relevant infrastructures	43.90	26.80	29.30	1.15	0.85	3 rd
Lack of internet facilities	31.70	39.00	29.30	1.02	0.79	4 th
Acceptable usage policy	31.70	36.60	31.70	1.00	0.81	5 th
Lack of locally relevant content and services	17.10	61.00	22.00	0.95	0.63	6 th
Lack of tech. appropriateness	29.30	34.10	36.60	0.93	0.82	7 th
Non-affordability	24.40	31.70	43.90	0.81	0.81	8 th
Interrupted power supply	14.60	14.60	70.70	0.43	0.33	9 th

Source: Field work (2017)

4.10: Constraints to use of ICT tools

Table 4.10 reveals that most of the respondents' opined that lack of financial resources ($\bar{x}=1.65$), inconsistency in salary payment ($\bar{x}=1.30$), inherent need in capacity building ($\bar{x}=1.22$), inadequate investments in getting ICT gadgets ($\bar{x}=1.21$) and lack of technical know-how ($\bar{x}=1.19$) are the major constraints to their use of information communication technologies relating to their extension duties. Lack of financial resources was found to be the most severe constraint limiting the use of communication tools for extension delivery purpose. This implies that poor financial support from the government and extension agencies financiers towards equipping the organisations with up to date information and communication technologies will inhibit the use of these facilities in their extension work. This finding corroborates Albert,(2014) who found out that financial constraint contributed a major factor in inhibiting effective use of communication tools by extension practitioners in the course of discharging their duties.

The study further categorised respondents into those of public and non-public extension organisations. Findings from Table 4.10.1 revealed the level of constraints in the use of ICTs between extension practitioners from public and non-public organisations. The level of constraints to ICT use was low for 41.90% of the respondents from the public organisation while 58.10% fell within high level of constraint to ICT use. Whereas 75.60% of respondents from non-public organisations fell within those with low level of constraints to ICT use, while 24.40% of respondents fell within those with high level of constraints to ICT use. This shows that a greater proportion of extension practitioners from the non-public organisations have minimal constraints in the use of ICTs compared with those from public organisation who experience a higher level of constraints. This implies that extension practitioners from non-public organisations tend to have minimal constraints to ICT use probably due to greater access they have to using these ICT tools in their various organisations for their extension activities.

In addition, constraints to respondents' use of ICTs were identified for public and non-public organisations. These were revealed in Table 4.10.2 as lack of financial resources ($\bar{x}=1.89$), which was the major constraint to respondents' use of ICT tools while gender restriction ($\bar{x}=0.73$) was the least constraint faced by respondents from public

organisation. This implies that lack of financial resources poses a great threat to use of ICT tools by respondents from public extension organisations in the course of performing their extension duties. This finding supports the IDI report gathered from a senior extension officer in ADP:

“inadequate financial support from government serves as the major hitch to having relevant ICT facilities for the few extension personnel on ground, even the few available tools for use also require regular maintenance with limited financial resources to make them functional for extension work” (a senior personnel from ADP, extension department, Ekiti state).

Moreover, specific constraints to respondents’ use of ICT tools were identified in Table 4.10.3 for non-public organisation. Low level of computer education ($\bar{x}=0.93$) was the major constraint to respondents use of ICT tools, while gender restriction ($\bar{x}=0.37$) was the least constraint to respondents’ use of ICT tools. This reveals that respondents from non-public organisations experiences limitation to using ICT tools most as a result of low computer education in their extension work. This implies that their low computer education could be easily worked upon through capacity building programmes organised within their various organisations. While they rarely experience gender restrictions to using these tools for their extension work in their organisation. This is further buttressed from IDI report from BAT and JDPC.

“extension personnel display of low computer exposure rarely comes up in our extension activities, whenever this deficiency shows up in our extension personnel performance, regular in-house exposure to ICT training will promptly be organised to equip our staff output (a senior personnel from BAT from human resource department, Oyo state).

Table 4.10: Constraints to use of ICT tools

Constraints	Serious constraints	Mild constraints	Not at all	Weighted Mean	Rank
Lack of financial resources	75.8	13.3	10.9	1.65	1 st
Inconsistence in salary payment	53.3	23.6	23.0	1.30	2 nd
Inherent need in capacity building	38.2	45.5	16.4	1.22	3 rd
Inadequate investments	40.6	39.4	20.0	1.21	4 th
Lack of technical know- how	40.6	38.2	21.2	1.19	5 th
Low level of computer education	38.2	33.3	28.5	1.10	6 th
Difficulty in integrating with existing media	34.5	39.4	26.1	1.08	7 th
Gender restriction	16.4	39.4	44.8	0.72	8 th

Source: Field work (2017)

Table 4.10.1: Disaggregated Level of constraints of respondents' use of ICT tools in public organisation

Organisation	Category	Frequency	Percentage	Min. score	Max. score	Mean
Public	Low	52	41.90	1.00	19.00	9.47±4.49
	High	72	58.10			
Non-public	Low	31	75.60	0.00	16.00	5.34±5.07
	High	10	24.40			

Source: Field work (2017)

Table 4.10.2: Constraints to respondents' use of ICT tools in public organisation

Constraints	Serious constraints	Mild constraints	Not at all	Weighted mean	Std. deviation	Rank
Lack of financial resources	89.50	14.60	14.60	1.89	0.36	1 st
Inconsistence in salary payment	65.30	29.30	26.80	1.57	0.64	2 nd
Inherent need in capacity building	46.00	61.00	22.00	1.40	1.13	3 rd
Inadequate investments	48.40	36.60	31.70	1.36	0.69	4 th
Lack of technical know-how	46.00	29.30	24.40	1.33	0.70	5 th
Difficulty in integrating with existing media	41.10	31.70	43.90	1.27	0.69	6 th
Low level of computer education	39.50	39.00	29.30	1.19	0.76	7 th
Gender restriction	19.40	26.80	29.30	0.83	0.73	8 th

Source: Field work (2017)

Table 4.10.3: Constraints to respondents' use of ICT tools in non-public organisation

Constraints	Serious constraints	Mild constraints	Not at all	Weighted mean	Std.deviation	Rank
Low level of computer education	34.10	24.60	51.20	0.93	0.72	1 st
Lack of financial resources	34.10	14.40	41.50	0.83	0.88	2 nd
Lack of technical know-how	24.40	29.30	46.30	0.78	0.82	3 rd
Inadequate investments	17.10	39.00	43.90	0.73	0.74	4 th
Inherent need in capacity building	14.60	39.00	46.30	0.68	0.72	5 th
Difficulty integrating with existing media	14.60	22.00	63.40	0.51	0.75	6 th
Inconsistence in salary payment	17.10	14.60	68.30	0.49	0.78	7 th
Gender restriction	7.30	22.00	70.70	0.37	0.62	8 th

Source: Field work (2017)

4.11: Utilisation of Information and Communication Technological tools for information gathering purposes

Result from Table 4.11 shows that mobile phone ($\bar{x}=2.87$) was mostly used by respondents for information gathering purpose, followed by radio ($\bar{x}=2.34$) and computer ($\bar{x}=2.28$). This reveals respondent majorly uses mobile phone mostly to transfer useful information on the improvement of crop and livestock enterprise of their clientele (Khondokar and Debashis, 2015). It shows that mobile phone is a formidable tool that can be used for effective communication, as well as enlightening of shady areas related to farmers' enterprise resulting in increased knowledge level of their clientele. Radio comes next as being used more frequently for information gathering purpose. This could be possible through clients calling in live while radio programmes is being aired, such that it could enable extension practitioners who acts as facilitators of the program to gather tangible areas of concern of their clientele's plight and suggest ways of tackling such areas to them (Yahaya, 2016). Computer tends to be used by respondents in gathering vital information on latest advancement on agriculture. This could be also stored as part of documentation on the hard drives of the computer, which can be easily retrieved for future or immediate uses. Fax ($\bar{x}=0.36$) was also the least used ICT tool by respondents from other organisations. This shows that fax might not be suitable for dissemination of relevant information to the clients (Islam *et al*, 2017).

Furthermore, respondents' level of information gathering purpose of communication tools on Table 4.11.1 shows that it is categorised as high with the distribution of 52.70% and mean of 24.10 ± 7.69 . This implies that a reasonable number of extension practitioners readily use most of the ICT tools available and accessible in their various extension organisations for information gathering purpose, so as to enable them get the necessary feedback as well as other reliable agricultural information that can improve their extension delivery services to their clientele.

The study further classified the respondents into those of public organisation and non-public organisations as regards the use of ICTs for information gathering purpose. Findings from Table 4.11.2 showed the level of information gathering purpose of ICTs between extension practitioners from public organisation and respondents from non-public organisations for information gathering purpose. Over half of the of

respondents(52.40%) from public organisation fell within those with low level information gathering purpose while 47.6% fell within those with high level of ICT use for information gathering purpose. Conversely, 68.30% of respondents from non-public organisations fell within those with high level of information gathering purpose for ICTs, while 31.70% of respondents fell within low level of information gathering purpose. This finding revealed that majority of extension practitioners from non-public organisation engaged in information gathering purpose more often than those extension practitioners from public organisation. This implies that extension practitioners from public organisations tend to use ICT tools less for information gathering purpose probably due to the limited access the respondents has in using the tools optimally in performing their extension obligations. This is further buttressed by an IDI report:

“extension personnel most often do not have sufficient access to using these communication tools for their extension service delivery due to inadequate financial resources to maintain the tools over a period of time.” (a senior personnel from ADP, from human resource department, Ogun state).

Table 4.11: Distribution of respondents showing utilisation of Information and Communication Technological tools for information gathering purposes

ICT tools	Always (%)	Sometimes (%)	Rarely (%)	Never (%)	Mean	Rank
Mobile phone	89.10	8.50	2.40	0 (0)	2.87	1 st
Radio	55.80	28.50	9.70	6.10	2.34	2 nd
Computer	52.70	29.10	11.50	6.70	2.28	3 rd
Camera	46.70	29.70	12.70	10.90	2.12	4 th
Internet	43.60	33.30	12.70	10.30	2.10	5 th
Video	32.70	41.80	20.00	5.50	2.02	6 th
T.V	34.50	34.50	24.20	6.70	1.97	7 th
E-mail	38.20	28.50	17.60	15.80	1.89	8 th
Audio recorder	31.50	30.90	26.10	11.50	1.82	9 th
Projector	23.60	29.10	24.20	23.00	1.53	10 th
CD-Rom	15.80	29.10	30.30	24.80	1.36	11 th
Scanner	13.30	12.10	25.50	49.10	0.90	12 th
Intercom	6.10	10.30	15.80	67.90	0.55	13 th
Fax	1.80	8.50	13.30	76.40	0.36	14 th

Source: Field work (2017)

*where always = about 25 days in a month, sometimes = about 17 days in a month, rarely = about 10 days in a month and never represents not at all

Table4.11.1: Pooled Level of information gathering purpose for utilisation of ICT tools among extension practitioners

Category	Frequency	Percentage	Min. score	Max. score	Mean
Low	78	47.30	3.00	42.00	24.10±7.69
High	87	52.70			

Source: Field work (2017)

Table 4.11.2: Disaggregated Level of Information gathering purpose for utilisation of ICT tools between extension practitioners from public and non-public organisations

Organisation	Category	Frequency	Percentage	Min. score	Max. score	Mean
Public	Low	65	52.40	3.00	36.00	23.19±7.63
	High	59	47.60			
Non-public	Low	13	31.70	9.00	42.00	26.88±7.29
	High	28	68.30			

Source: Field work (2017)

4.12: Utilisation of Information and Communication Technological tools for documentation purposes

Result from Table 4.12 shows that mobile phone ($\bar{x}=2.83$) was mostly used by respondents for documentation purpose, followed by radio ($\bar{x}=2.13$) and camera ($\bar{x}=2.08$). This implies that extension practitioners tend to use mobile phone most in keeping records of important details of extension activities carried out with their clientele. This projects mobile phone as a quick resort to documenting real life experiences especially using short messaging service (SMS) when with their clienteles on the field (FAO, 2014). Also, the use of radio comes as next probably because it's a tool that is readily familiar with the rural farmers for getting reliable agricultural messages that can be applied on their farms. Extension practitioners could therefore make use of it for documenting series of agricultural programmes that can be aired for the farmers benefit (Yahaya, 2016). While camera tend to be also used for documentation purpose, as relevant images of new agricultural hybrids can be stored and transferred through the digital camera for their clienteles use. This could also aid in making a photo album book or magazine for deeper clarity on latest hybrids of plant or animal parts the farmers need to know about (Vignare, 2013). Fax ($\bar{x}=0.23$) was the least used ICT tool by the respondents for documentation purpose. This indicated that fax as an ICT tool might not be available for use in both public and other organisations probably due to lack of relevance of the tool to documenting extension messages for their target audience use (Albert, 2014).

Furthermore, respondents' level of documentation of communication tools on Table 4.12.1 shows that it is categorised as high with the distribution of 55.20% and mean of 23.25 ± 7.40 . This reveals that a reasonable number of extension practitioners readily use most of the ICT tools available and accessible in their various extension organisations for documentation purpose, which tend to enhance their extension delivery services to their clienteles.

The study further categorised the respondents into those of public organisation and non-public organisations as regards the use of ICTs for documentation purpose. Findings from Table 4.12.2 showed the level of documentation purpose of ICTs between extension practitioners from public organisation and respondents from non-

public organisations for documentation purpose. 51.60% of respondents from public organisation fell within those with low level of ICT use for documentation purpose, while 48.40% fell within those with high level of ICT use for documentation purpose. Alternatively, 75.60% of respondents from non-public organisations fell within those with high level of documentation purpose for ICTs, while 24.40% of respondents fell within low level of documentation purpose. This finding revealed that majority of extension practitioners from non-public organisation engage in documentation purpose more often than those extension practitioners from public organisations. This implies that extension practitioners from non-public organisations tend to use ICT tools more for documentation purpose probably as a result of greater accessibility they have in using these tools more in their extension activities. This further explains the higher tendency for extension practitioners to use ICTs to store, process and retrieve agricultural information that will aid their clienteles' enterprises.

Table4.12: Distribution of respondents showing utilisation of ICTs for documentation purposes

ICT tools	Always (%)	Sometimes (%)	Rarely (%)	Never (%)	Mean	Rank
Mobile phone	87.30	8.50	4.20	0	2.83	1 st
Radio	48.50	26.10	15.80	9.70	2.13	2 nd
Camera	42.40	32.10	17.00	8.50	2.08	3 rd
Computer	46.10	27.30	18.20	8.50	2.11	4 th
Internet	41.20	30.90	18.80	9.10	2.04	5 th
Video	29.10	42.40	21.20	7.30	1.93	6 th
T.V	27.90	32.10	27.90	12.10	1.76	7 th
E-mail	41.20	23.00	18.80	17.00	1.72	8 th
Projector	24.20	34.50	23.60	17.60	1.55	9 th
Audio recorder	20.60	35.80	27.30	16.40	1.61	10 th
CD-Rom	14.50	29.70	30.90	24.80	1.20	11 th
Scanner	12.70	20.00	24.20	43.00	0.79	12 th
Intercom	7.30	8.50	13.90	70.30	0.59	13 th
Fax	1.80	4.80	17.00	76.40	0.29	14 th

Source: Field work (2017)

*where always = about 25 days in a month, sometimes = about 17 days in a month, rarely = about 10 days in a month and never represents not at all

Table 4.12.1: Pooled Level of Documentation purpose for utilisation of ICT tools for extension activities

Category	Frequency	Percentage	Min. score	Max. score	Mean
Low	74	44.80	3.00	38.00	23.25±7.40
High	91	55.20			

Source: Field work (2017)

Table 4.12.2: Disaggregated Level of Documentation purpose for utilisation of ICT tools between extension practitioners from public and non-public organisations

Organisation	Category	Frequency	Percentage	Minimum score	Maximum score	Mean
Public	Low	64	51.60	3.00	38.00	22.06±7.17
	High	60	48.40			
Non-public	Low	10	24.40	5.00	37.00	26.85±6.96
	High	31	75.60			

Source: Field work (2017)

4.13: Utilisation of Information and Communication Technological tools for dissemination purposes

Result from Table 4.13 shows that mobile phone ($\bar{x}=2.90$) was mostly used by respondents for dissemination purpose, followed by radio ($\bar{x}=2.32$) and camera ($\bar{x}=2.07$). This reveals respondent mainly uses mobile phone in transferring relevant agricultural information to their clientele. This implies that mobile phone is a very useful tool in supporting knowledge sharing and facilitating access to up to date information between client and extension service providers (Khondokar and Debashis, 2015). Radio comes next as being used more frequently for dissemination purpose probably because of its wider coverage in reaching a larger number of audiences in remote areas. This could help in reducing the number of farmers that could have been marginalised from social changes been initiated in rural areas through dissemination of agricultural messages on the radio. Camera tends to be also used for disseminating purpose as a result of the clearer messages been transferred in pictorial forms for mental enhancement of agricultural messages passed across to farmers (FLD, 2010). Fax ($\bar{x}=0.29$) was the least used ICT tool by respondents from public organisation. This reveals that fax might not be appropriate in the dissemination of agricultural information to farmers, as farmers might not have access to it (Islam *et al*, 2017).

Furthermore, respondents' level of dissemination of communication tools on Table 4.13.1 shows that it is categorised as high with the distribution of 55.20% and mean of 22.87 ± 7.54 . This reveals that a reasonable number of extension practitioners readily use most of the ICT tools available and accessible in their various extension organisations for dissemination purpose, so as to enable them perform the core function of their extension delivery services to their clientele.

The study went ahead to look at categorising the respondents into those of public organisation and non-public organisations as regards the use of ICTs for dissemination purpose. Findings from Table 4.13.2 showed the level of dissemination purpose of ICTs between extension practitioners from public organisation and respondents from non-public organisations for dissemination purpose. Half of the respondents (50.00%) from public organisation fell within those with low level and high level of ICT use

concurrently for dissemination purpose. Alternatively, 70.70% of respondents from non-public organisations fell within those with high level of dissemination purpose for ICTs, while 29.30% of respondents fell within low level of dissemination purpose. This finding revealed that majority of extension practitioners from non-public organisation engaged in dissemination purpose more often than those extension practitioners from public organisations. This implies that extension practitioners from non-public organisations tend to use ICT tools more for dissemination purpose probably due to the unrestricted access the respondents has in using the tools optimally in performing their extension obligations. This further explains an IDI report:

“extension personnel find it more convenient to render their extension duties efficiently due to a specified quota of internet access given to them freely on a monthly basis in order to sustain an excellent extension service delivery with their clientele.”(a senior personnel at JDPC, from human resource department, Ogun state).

Table 4.13: Distribution of respondents showing utilisation of Information and Communication Technological tools for dissemination purposes

ICT tools	Always (%)	Sometimes (%)	Rarely (%)	Never (%)	Mean	Rank
Mobile phone	90.30	9.70	0	0	2.90	1 st
Radio	54.50	29.10	10.30	6.10	2.32	2 nd
Camera	43.00	33.90	10.90	12.10	2.07	3 rd
Computer	38.80	32.10	18.80	10.30	1.99	4 th
Video	32.30	41.50	15.20	11.00	1.95	5 th
T.V	35.20	35.80	17.60	11.50	1.94	6 th
Internet	37.60	31.50	18.20	12.70	1.94	6 th
E-mail	29.10	30.90	23.00	17.00	1.72	8 th
Audio recorder	20.00	38.20	24.80	17.00	1.61	9 th
Projector	18.20	34.50	30.90	16.40	1.55	10 th
CD-Rom	10.90	29.70	27.90	31.50	1.20	11 th
Scanner	10.90	10.90	24.20	53.90	0.79	12 th
Intercom	9.10	8.50	14.50	67.90	0.59	13 th
Fax	2.40	4.20	13.30	80.00	0.29	14 th

Source: Field work (2017)

*where always = about 25 days in a month, sometimes = about 17 days in a month, rarely = about 10 days in a month and never represents not at all

Table 4.13.1: Pooled Level of Dissemination purpose for utilisation of ICT tools for extension activities

Category	Frequency	Percentage	Min. score	Max. score	Mean
Low	74	44.80	3.00	37.00	22.87±7.54
High	91	55.20			

Source: Field work (2017)

Table 4.13.2: Disaggregated Level of Dissemination purpose between extension practitioners from public and non-public organisations

Organisation	Category	Frequency	Percentage	Min. score	Max. score	Mean
Public	Low	62	50.00	3.00	37.00	22.87±7.54
	High	62	50.00			
Non-public	Low	12	29.30	6.00	37.00	26.10±7.53
	High	29	70.70			

Source: Field work (2017)

Conclusively, data shown in Figure 3 revealed the overall mean of extension purposes employed by extension practitioners in their use of ICTs most as information gathering purpose ($\bar{x}=24.10$) followed by documentation purpose ($\bar{x}=23.25$) and next for dissemination purpose ($\bar{x}=22.87$). This infers that respondents' utilisation of ICT tools for information gathering purpose, buttresses the conventional information flow that starts from the researchers to extension and finally to farmers. This information flow can also come from the farmer to extension and back to the researchers as feedback. This equally explains that extension practitioners' limits their use of ICTs to the level of the farmers for substantial information exchange between the duo.

Aside getting the necessary information from farmers and research, findings also revealed that extension practitioners make use of documentation purpose for each of these communication tools. Documentation purpose provides detail of extension activities carried out at different periods for record purposes. This will enhance proper record keeping of how extension scheme of activities are being implemented within the specific time frames. It will also assist in evaluating how much progress has been achieved at every stage of development in rating extension activities. This can be used to further explain how the utilisation of ICTs for documentation purpose comes into play when information gathered from researchers and farmers is being promptly stored and retrieved with ease for extension use on the various communication tools.

Finally, extension practitioners also transfer relevant information through the use of these communication tools for dissemination purpose so as to effectively assist farmers in making wise decisions about farm resources and inputs at their disposal. This helps the farmers to know those farm inputs that are available, accessible and affordable to them in order to enhance their economic status and upgrade their social standard (FAO, 2016)

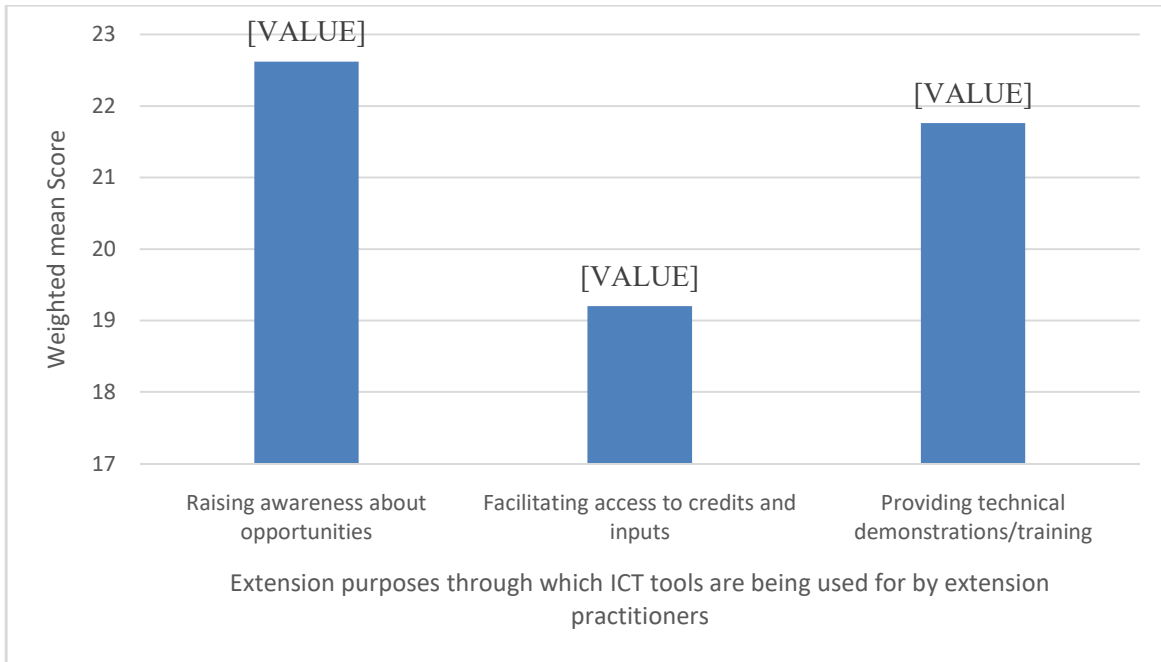


Fig 5: Distribution of respondents by purposes of use of ICTs

Source: Field work (2017)

4.14: Utilisation of ICTs in linking clients to market by the respondents

Result from Table 4.14 shows that mobile phone ($\bar{x}=2.85$) was mostly used to link clients to markets followed by radio ($\bar{x}=2.39$) and internet ($\bar{x}=2.04$). This implies that extension practitioners optimises mobile phone most in reaching their clientele by facilitating their clientele access to marketing their farm produce to various outlets where they can sold at reasonable prices. Also the use of radios tend to largely help farmers living in remote areas to obtain reliable information on where they can readily get market for their farm produce, especially where access to internet is limited. Moreover, the use of internet helps in going beyond the local boundaries to gaining new frontiers especially in obtaining larger and ready-made markets for their farm produce by large-scale farmers. This implies that mobile phone; radio and internet are greatly relevant in linking clients to market as they tend to break geographical limitations mostly encountered by farmers in disposing their farm produce. This might have led to glut, loss or wastage of their farm produce if not but for the intervention of using these ICT tools for prompt sales of their farm produce. Though fax ($\bar{x}=0.36$) was the least used ICT tool in linking clients to markets, this probably must have been as a result of the tool not been appropriate for information dissemination to rural farmers in developing countries (Olarenwaju *et al*, 2017).

The study further categorised the respondents into those of public organisation and non-public organisations as regards the use of ICTs in linking clients to markets. Findings from Table 4.14.1 showed the level of utilisation of ICTs in linking clients to markets between extension practitioners from public organisation and respondents from non-public organisations in the use of ICTs. Over half of the respondents (54.80%) from public organisation fell within those with high level of ICT use, while 45.20% fell within those with low level of ICT use in linking clients to market. Alternatively, 75.60% of respondents from non-public organisations fell within those with high level of ICT use, while 24.40% of respondents fell within low level of ICT use in linking clients to markets. This shows that respondents from non-public organisations tend to use ICT tools more in linking clients to markets over those from the public organisation. This probably could be as a result of the relevance of those essential tools like mobile phone, radio and internet in the course of disseminating their extension duties. It has been observed that

the use of those ICT tools mostly used by respondents from other extension organisations apart from that of the public has a greater impact on their target audience. This could probably be due to having more access to using these tools in their organisations and greater exposure to timely information on prices of agricultural produce as well as other agricultural-related activities that can greatly improve the productivity of their target clientele (Vignare, 2013).

Table 4.14: Distribution showing utilisation of ICTs in linking clients to market by the respondents

Linking clients to market						
ICT tools	Always (%)	Sometimes (%)	Rarely (%)	Never (%)	Mean	Rank
Mobile phone	86.70	11.50	1.80	0.00	2.85	1 st
Radio	57.00	29.70	9.10	4.20	2.39	2 nd
Internet	42.40	29.70	17.00	10.90	2.04	3 rd
T.V	34.50	35.80	21.20	8.50	1.96	4 th
Camera	37.60	32.10	18.80	11.50	1.96	4 th
Computer	33.30	35.20	17.00	14.50	1.87	6 th
Video	32.10	34.50	20.60	12.70	1.86	7 th
E mail	27.30	31.50	21.20	20.00	1.66	8 th
Audio Recorder	21.80	34.50	23.00	20.60	1.58	9 th
Projector	21.20	29.70	25.50	23.60	1.49	10 th
Scanner	11.50	13.30	24.20	50.90	0.85	12 th
Intercom	7.90	7.90	16.40	67.90	0.56	13 th
Fax	3.00	6.70	13.30	77.00	0.36	14 th
Scanner	11.50	13.30	24.20	50.90	0.85	12 th
Grand mean					22.49	

Source: Field work (2017)

*where always = about 25 days in a month, sometimes = about 17 days in a month, rarely = about 10 days in a month and never represents not at all

Table 4.14.1: Disaggregated Level of utilisation of ICT tools in linking clients to market between respondents' from public and non-public organisations

Organisation	Category	Frequency	Percentage	Min. score	Max. score	Mean
Public	Low	56	45.20	3.00	38.00	21.79±7.53
	High	68	54.80			
Non-public	Low	10	24.40	7.00	42.00	24.61±7.56
	High	31	75.60			

Source: Field work (2017)

4.15: Utilisation of ICTs for raising awareness about opportunities by the respondents

Results from Table 4.15 shows that mobile phone was mostly used by respondents in raising awareness about opportunities with mean weighted value of 2.83. This is followed by radio ($\bar{x}=2.53$) and television ($\bar{x}=2.19$). This infers that awareness of opportunities which are available and accessible to enhancing farmers' production tend to be facilitated more through the use of mobile phones by extension practitioners. The use of radio also leads to greater spread of information among the rural farming populace where mobile phone might not reach. Also, the use of television plays a major role in creating awareness of agricultural opportunities to farmers especially in farming communities where agricultural broadcasts has evenly penetrated and has been largely watched in groups by the farmers (Yahaya, 2013). This implies that mobile phone, radio and television plays a greater role in creating life changing situations to farmers, due to the higher penetration of awareness of opportunities that could lead to sustained level of production to the rural populace. Fax ($\bar{x}=0.30$) was also the least ICT tool that was used by respondents from public organisation. This could be as a result of its non- availability to the practitioners as well as to the clientele (Yakubu *et al*, 2013).

The study further classified the respondents into those of public organisation and non-public organisations as regards use of ICTs in raising awareness about opportunities by the extension practitioners. Result from Table 4.15.1 reveals that showed the level of utilisation of ICTs in raising awareness about opportunities between extension practitioners from public organisation and respondents from other organisations in the use of ICTs. Over half of the respondents (57.30%) from public organisation fell within those with high level of ICT use, while 42.70% fell within those with low level of ICT use in linking clients to market. Alternatively, 70.70% of respondents from non-public organisations fell within those with high level of ICT use, while 29.30% of respondents fell within low level of ICT use in linking clients to markets. This shows that respondents from non-public organisations tend to use ICT tools more in giving relevant agricultural-related information that could stimulate the interest of the farmers to trying something

new. This probably could be as a result of the respondent using those tools that their clientele find more accessible to receive agricultural messages in their disseminating activities. This could enhance the clientele's decision-making power in accepting or adopting latest innovation over the old ones they have been used to. It could also empower their clientele to keep abreast of information on current prices of agricultural products and as a result aid in greater transaction process of possible buyers and producers to reaching a fair deal (Bells *et al* 2013). This corroborates the findings of Francis, (2014) who found out that extension service delivery is not sufficient on its own to bring a complete transformation to the standard of living of the rural populace except it is supported with appropriate technologies.

Table 4.15: Distribution showing utilisation of ICTs in raising awareness about opportunities by the respondents

Raising awareness about opportunities						
ICT tools	Always (%)	Sometimes (%)	Rarely (%)	Never (%)	Mean	Rank
Mobile phone	88.50	8.50	1.20	1.80	2.83	1 st
Radio	66.70	24.20	4.80	4.20	2.53	2 nd
T.V	43.00	38.20	13.90	4.80	2.19	3 rd
Video	34.80	41.50	18.90	4.90	2.06	4 th
Internet	40.60	29.70	17.00	12.70	1.98	5 th
Computer	35.20	31.50	18.20	15.20	1.87	6 th
Camera	38.20	26.70	19.40	15.80	1.87	6 th
E mail	25.50	29.70	24.80	20.00	1.61	8 th
Projector	21.80	32.70	27.30	18.20	1.58	9 th
Audio Recorder	21.20	32.10	23.0	23.60	1.51	10 th
CD Rom	12.70	17.60	24.80	44.80	0.98	11 th
Scanner	9.70	14.50	18.80	57.00	0.77	12 th
Intercom	4.20	11.50	18.20	66.10	0.54	13 th
Fax	2.40	5.50	11.50	80.60	0.30	14 th
Grand mean					22.62	

Source: Field work (2017)

*where always = about 25 days in a month, sometimes = about 17 days in a month, rarely = about 10 days in a month and never represents not at all

Table 4.15.1: Disaggregated Level of utilisation of ICT tools in raising awareness about opportunities between respondents' from public and non-public organisations

Organisation	Category	Frequency	Percentage	Min. score	Max. score	Mean
Public	Low	53	42.70	3.00	33.00	21.52±7.30
	High	71	57.30			
Non-public	Low	12	29.30	4.00	33.00	22.85±6.30
	High	29	70.70			

Source: Field work (2017)

4.16 Utilisation of ICTs for providing technical demonstration/training by the respondents

Result from Table 4.16 depicts that mobile phone was the most utilised ICT tool in providing technical demonstration and training to clientele by the respondents with weighted mean score as 2.55. This is followed by radio ($\bar{x} = 2.28$) and video ($\bar{x} = 2.15$). This reveals that mobile phone is a veritable tool that can be used by respondents in providing training to farmers through various social media platforms displayed on the mobile phone. The use of radio by respondents also shows that agricultural trainings can be aired for farmers to gain newer ways of improving their farm productivity. The use of videos also shows how practical demonstration on new farm innovations can be practically learned by farmers when video is being operated by extension practitioners in the process of training their clientele. This implies that these three cogent ICT tools tend to be more explicit to training farmers on new agricultural innovations. It further proves that they are more easily accessible and available over other tools to the farmers, during the course of receiving those trainings from extension practitioners. The least used tool by respondents from public organisation was fax ($\bar{x} = 0.16$). This shows that fax tend to be rarely used in diagnosis of farmers' problems probably because most of the clients rarely has access to it (Islam *et al*, 2017)

The study further compartmentalised the respondents into those of public organisation and non-public organisations as regards use of ICTs in providing technical demonstration by the extension practitioners. Findings from Table 4.16.1 showed the level of utilisation of ICTs in providing technical demonstration and training between extension practitioners from public organisation and those from non-public organisations. Slightly over half of the respondents (53.20%) from public organisation fell within those with high level of ICT use, while 46.80% fell within those with low level of ICT use in providing technical demonstration. Conversely, 65.90% of respondents from non-public organisations fell within those with high level of ICT use, while 34.10% of respondents fell within low level of ICT use in providing technical demonstration. This reveals that respondents from non-public organisations tend to use ICTs more in providing technical demonstration. This could be as a result of more life changing impacts these demonstrations might have on their clientele. This might be connected to little or no

limitations encountered by clients from non-public organisations in accessing these tools for their extension work which is incomparable with the limitations encountered by the clients of respondents from the public organisation (Verma, Sharma, Singh, Chayal and Meena, 2014).

Table 4.16: Distribution showing utilisation of ICTs in providing technical demonstration/training by the respondents

Providing technical demonstration/training						
ICT tools	Always (%)	Sometimes (%)	Rarely (%)	Never (%)	Mean	Rank
Mobile phone	75.20	10.30	9.10	5.50	2.55	1 st
Radio	50.90	32.10	10.90	6.10	2.28	2 nd
Video	43.60	33.90	16.40	6.10	2.15	3 rd
T.V	39.40	31.50	21.80	7.30	2.03	4 th
Camera	41.20	27.90	17.00	13.90	1.96	5 th
Computer	37.60	32.10	18.20	12.10	1.95	6 th
Internet	31.50	32.70	17.00	18.80	1.77	7 th
Projector	28.50	32.10	19.40	20.00	1.69	8 th
Audio Recorder	23.60	32.10	23.00	21.20	1.58	9 th
E mail	21.20	23.00	23.60	32.10	1.33	10 th
CD Rom	8.50	23.60	30.30	37.60	1.03	11 th
Scanner	9.70	10.30	20.60	59.40	0.70	12 th
Intercom	1.80	10.90	16.40	70.90	0.44	13 th
Fax	1.80	6.10	11.50	80.60	0.29	14 th
Grand mean					21.76	

Source: Field work (2017)

*where always = about 25 days in a month, sometimes = about 17 days in a month, rarely = about 10 days in a month and never represents not at all

Table 4.16.1: Disaggregated Level of utilisation of ICT tools in providing technical demonstration between respondents' from public and non-public

Organisation	Category	Frequency	Percentage	Min. score	Max. score	Mean
Public	Low	58	46.80	2.00	36.00	21.19±7.74
	High	66	53.20			
Non-public	Low	14	34.10	0.00	37.00	23.49±7.27
	High	27	65.90			

organisations

Source: Field work (2017)

4.17: Utilisation of ICTs in diagnosis of problems and recommending a solution by the respondents'

Data from Table 4.17 shows that mobile phone was mostly used in diagnosing problems and recommending a solution by the respondents with a weighted mean score of 2.63. This is followed by radio ($\bar{x}= 2.20$) and internet ($\bar{x}=1.93$). This reveals that with the revolution of ICT use in information dissemination, the process of getting feedback from the farmers can be realised by enquiring from them through the use of mobile phone on various problems encountered by the clientele; as well as recommending necessary steps to take before visiting them on their farms or homes afterwards. This implies that the use of mobile phone can elicit prompt feedback from the clientele which enhances the farmers' knowledge and practice on his production (Vignare, 2013).

Also, radio tends to be relevant in this context as it provides a platform for farmers to bring in the problems encountered on production during a live call in radio programme that is being aired for rural farming communities. The use of internet also aid in obtaining clues to issues being faced by farmers on their production, when extension practitioners explore the cause of such problems on the internet from the Agricultural Knowledge and Information System platform (AKIS). This will consequently help in recommending appropriate steps to be taken to their clientele. The least used tool by respondents from public organisation was fax ($\bar{x}= 0.16$). This shows that fax tend to be rarely used in diagnosis of farmers' problems probably because most of the clients rarely has access to it (Islam *et al*, 2017).

The study further compartmentalised the respondents into those of public organisation and non-public organisations as regards use of ICTs in diagnosis of problems and recommending a solution by the extension practitioners. Findings from Table 4.17.1 showed the level of utilisation of ICTs in diagnosis of problems and recommending a solution between extension practitioners from public organisation and those from other organisations. Slightly over half of the respondents (52.40%) from public organisation fell within those with high level of ICT use, while 47.60% fell within those with low level of ICT use in providing technical demonstration. Alternatively, 75.60% of respondents from non-public organisations fell within those with high level of ICT use, while 24.40% of respondents fell within low level of ICT use in providing

technical demonstration. This shows that respondents from non-public organisations tend to use ICTs more in diagnosis of field problems probably through deeper interaction with their clientele about challenges encountered on the field through the use of ICTs. This further reveals that their use of ICTs in recommending solutions to their clientele's problem could be as a result of the higher skills they might have acquired through various ICT capacity building programmes and educational workshops that are agricultural-based, over those respondents from public organisation. This is in line with the work of Bell *et al*, (2013) that extension personnel demonstrate their expertise when they not only interact with their audience through ICT tools, but are also identify farmers need and areas of concern by giving or showing a technical way out of it for them.

Table 4.17: Distribution showing utilisation of ICTs in diagnosis of problems and recommending a solution by the respondents

Diagnosis of problems and recommending a solution						
ICT tools	Always	Sometimes	Rarely	Never	Mean	Rank
	(%)	(%)	(%)	(%)		
Mobile phone	72.70	20.60	3.60	3.00	2.63	1 st
Radio	49.10	29.70	13.30	7.90	2.20	2 nd
Internet	38.20	30.30	18.20	13.30	1.93	3 rd
Computer	34.50	33.90	18.20	13.30	1.90	4 th
Video	32.10	37.60	18.20	12.10	1.90	4 th
T.V	32.10	35.20	21.80	10.90	1.88	6 th
Camera	33.30	33.90	18.20	14.50	1.86	7 th
Audio Recorder	21.80	30.30	27.30	20.60	1.53	8 th
Projector	23.60	26.10	24.80	25.50	1.48	9 th
E mail	23.60	21.80	27.30	27.30	1.42	10 th
CD Rom	9.70	21.20	29.70	39.40	1.01	11 th
Scanner	10.30	13.90	19.40	56.40	0.78	12 th
Intercom	6.10	7.30	17.00	69.70	0.49	13 th
Fax	1.80	6.10	10.30	81.80	0.28	14 th
Grand mean					21.29	

Source: Field work (2017)

*where always = about 25 days in a month, sometimes = about 17 days in a month, rarely = about 10 days in a month and never represents not at all

Table 4.17.1: Disaggregated Level of utilisation of ICT tools in diagnosis of problems and recommending a solution between respondents' from public and non-public organisations

Organisation	Category	Frequency	Percentage	Min. score	Max. score	Mean
Public	Low	59	47.60	0.00	34.00	20.02±7.59
	High	65	52.40			
Non-public	Low	10	24.40	0.00	34.00	22.02±7.01
	High	31	75.60			

Source: Field work (2017)

4.18: Utilisation of ICTs for responding to follow up questions from clients by the respondents

Result from Table 4.18 shows that mobile phone is mostly used for responding to follow up questions from clients by the respondents with a weighted mean score of 2.63. This is followed by radio ($\bar{x}=2.20$) and internet ($\bar{x}=1.93$). This reveals that mobile phone was largely used by most of the extension practitioners in getting across relevant information to their clients based on questions initially raised by them. This implies that the use of mobile phone in responding to follow up questions raised by clients is very efficient and dynamic to alleviating unnecessary tension that would have been created for extension practitioners in getting immediate contact to solving their clientele's problems geographically. The radio and internet also plays a vital role in giving prompt response to questions raised by clients as it aids in reducing geographical limitations of reaching clients who has burning questions on their agricultural production activities. It also revealed that fax ($\bar{x}= 0.18$) was the least ICT tool used by the respondents. This shows that fax might not be relevant to using it to respond to follow up questions from clients (Yakubu *et al*, 2013)

The study further classified the respondents into those of public organisation and other organisations as regards use of ICTs in responding to follow up questions from clients. Findings from Table 4.18.1 showed the level of utilisation of ICTs in response to follow up questions between extension practitioners from public organisation and those from other organisations. Over half of the respondents (55.60%) from public organisation fell within those with high level of ICT use, while 44.40% fell within those with low level of ICT use in providing technical demonstration. Alternatively, 56.10% of respondents from non-public organisations fell within those with high level of ICT use, while 43.90% of respondents fell within low level of ICT use in responding to follow up questions. This shows that the slight difference observed in the use of ICTs by respondents from non-public organisations over those from public could be as a result of regular exposure received on special extension programmes with resource-oriented personnel who tend to educate and impart the necessary skills and training to the extension practitioners. This is further buttressed by organisational reports obtained from these non-public organisations that extension practitioners from these organisations have

close collaboration with both foreign indigene extension experts, where knowledge sharing and dialogue on recent agricultural updates are learnt and shared to aid their extension work(JDPC, 2015, BAT Report 2016 and USAID 2017).

Table 4.18: Distribution showing utilisation of ICTs to response to follow up questions from clients by the respondents

Responses to follow up questions from clients						
ICT tools	Always (%)	Sometimes (%)	Rarely (%)	Never (%)	Mean	Rank
Mobile phone	81.20	17.00	1.80	0.00	2.80	1 st
Radio	53.90	23.60	12.10	10.30	2.20	2 nd
Internet	38.80	26.70	18.80	15.80	1.88	3 rd
Computer	32.50	33.90	20.60	13.90	1.83	4 th
Camera	32.10	30.30	19.40	18.20	1.76	5 th
Video	29.10	26.10	31.50	13.30	1.71	6 th
TV	29.10	26.10	29.10	15.20	1.70	7 th
Audio Recorder	26.70	23.00	28.50	21.80	1.55	8 th
E mail	24.80	28.50	21.20	25.50	1.53	9 th
Projector	19.40	28.50	26.70	25.50	1.42	10 th
CD Rom	7.90	22.40	27.30	42.40	0.96	11 th
Scanner	5.50	13.30	20.00	61.20	0.63	12 th
Intercom	5.50	6.70	16.40	71.50	0.46	13 th
Fax	2.40	4.20	13.30	80.00	0.29	14 th
Grand mean					20.72	

Source: Field work (2017)

*where always = about 25 days in a month, sometimes = about 17 days in a month, rarely = about 10 days in a month and never represents not at all

Table 4.18.1: Disaggregated Level of utilisation of ICT tools to response to follow up questions from clients between respondents' from public and non-public organisations

Organisation	Category	Frequency	Percentage	Min. score	Max. score	Mean
Public	Low	55	44.40	2.00	36.00	20.33±8.00
	High	69	55.60			
Non-public	Low	18	43.90	8.00	41.00	21.93±8.17
	High	23	56.10			

Source: Field work (2017)

4.19: Respondents' utilisation of ICTs for providing mass advisories by the respondents

Data from Table 4.19 shows that mobile phone is mostly used in providing mass advisories by respondents' with a weighted mean score of 2.71. This is followed by radio ($\bar{x}=2.38$) and television ($\bar{x}=2.18$). This reveals that mobile phone tends to be used most by extension practitioners as a result of the potential it exhibits in getting information across to the rural farmers. This implies that mobile phone is pivotal to information dissemination and easy reception of messages most especially to target clientele for greater effect on clients production activities. Also, the use of radio and television by respondents in their extension delivery will go a long way in reaching out to a large audience at a time as this will facilitate quick diffusion and adoption of agricultural innovation to their clientele. This implies that it will enhance duplication of extension efforts to rural farming communities where extension personnel might not be able to cover due to their extreme geographical locations.

The study went further categorised the respondents into those of public organisation and non-public organisations as regards the use of ICTs in providing mass advisories. Findings from Table 4.19.1 showed the level of utilisation of ICTs in providing mass advisories between extension practitioners from public organisation and those from other organisations. 52.40% of respondents from public organisation fell within those with high level of ICT use, while 47.60% fell within those with low level of ICT use in providing mass advisories. Conversely, 65.90% of respondents from non-public organisations fell within those with high level of ICT use, while 34.10% of respondents fell within low level of ICT use in providing mass advisories. This implies that extension practitioners from non-public organisations tend to utilise ICT tools more in providing mass advisories than those from public organisation. This could be due to the interconnectedness of using more than two ICT tools together in their extension service delivery forum. For instance the use of internet, email and computer tend to exhibit synergetic line of function when sending messages to clients through the computer. This could have a way of enabling extension messages to be conveniently passed across to a larger number of clientele simultaneously with much greater impact in their farming activities (Sahlaney, *et al* 2015).

Table 4.19: Distribution showing utilisation of ICTs in providing mass advisories by the respondents

Providing mass advisories						
ICT tools	Always (%)	Sometimes (%)	Rarely (%)	Never (%)	Mean	Rank
Mobile phone	80.60	13.30	3.00	3.00	2.71	1 st
Radio	57.60	29.10	7.30	6.10	2.38	2 nd
T.V	40.60	44.20	7.30	7.90	2.18	3 rd
Video	41.80	37.60	13.90	6.70	2.15	4 th
Internet	40.00	26.70	17.60	15.80	1.91	5 th
Computer	37.00	29.70	17.00	16.40	1.87	6 th
Camera	30.90	33.90	17.60	17.60	1.78	7 th
Projector	29.70	29.10	21.80	19.40	1.69	8 th
Audio Recorder	26.10	27.90	25.50	20.60	1.59	9 th
E mail	23.00	30.90	22.40	23.60	1.53	10 th
CD Rom	10.90	20.00	29.10	40.00	1.02	11 th
Scanner	7.30	9.70	22.40	60.60	0.64	12 th
Intercom	4.80	9.10	17.00	69.10	0.50	13 th
Fax	1.80	4.80	13.30	80.00	0.28	14 th
Grand mean					21.76	

Source: Field work (2017)

*where always = about 25 days in a month, sometimes = about 17 days in a month, rarely = about 10 days in a month and never represents not at all

Table 4.19.1: Disaggregated Level of utilisation of ICT tools in providing mass advisories between respondents' from public and non-public organisations

Organisation	Category	Frequency	Percentage	Min. score	Max. score	Mean
Public	Low	59	47.60	2.00	40.00	21.57±8.23
	High	65	52.40			
Non-public	Low	14	34.10	3.00	42.00	24.24±9.37
	High	27	65.90			

Source: Field work (2017)

4.20: Utilisation of ICTs to facilitating access to credits and inputs

Data from Table 4.20 shows that mobile phone is mostly used by respondents in facilitating access to credits and inputs with a weighted mean score of 2.81. This is followed by the use of radio ($\bar{x}=2.24$) and television ($\bar{x}=1.87$). This shows that extension practitioners employ mobile phone most in transferring relevant information that will enable their clientele to having a hitch-free access to obtaining credits from agricultural financial institutions. This implies that that respondents' could use this medium to educate their clientele on how to access farm inputs for improved production, as well as enlightening them on how to gain financial access through mobile applications on phone so as to obtain loans from agricultural banks and other commercial financial institutions (Vignare, 2013). Moreover, use of mobile phone by the respondents also provides ample information on what, where and how to obtain farm inputs from relevant agricultural organisations or research institutes.

Also, respondents use radio and television as well in facilitating access to credits for their clientele. This infers that these two ICT tools tend to provide vivid clarification on how farmers could have access to credits and inputs by showcasing other clients that have benefitted from the process to non-beneficiaries through live broadcast. The use of radio and television could also give credible information on how farmers could get access to credit and farm input facilities from the state government, federal and non-governmental organisation with detailed clarification of the processes to follow through. It was also noted that fax ($\bar{x}=0.12$) was the least used ICT tool by respondents from public organisation. This equally reveals that fax might not be a relevant tool in educating farmers in getting access to credits and inputs by the extension practitioners (Bells, 2016).

The study further categorised the respondents into those of public organisation and non-public organisations as regards the use of ICTs in facilitating access to credits and inputs. Result from Table 4.20.1 showed the level of utilisation of ICTs in facilitating access to credits and inputs between extension practitioners from public organisation and those from non-public organisations. Half of the respondents (50.80%) from public organisation fell within those with high level of ICT use, while 49.20% fell within those with low level of ICT use in facilitating access to credits and inputs. Conversely, 56.10%

of respondents from non-public organisations fell within those with high level of ICT use, while 43.90% of respondents fell within low level of ICT use in facilitating access to credits and inputs. The slight difference observed between the two organisations shows that they both utilise ICT tools very well in facilitating access to credits for their clienteles. This probably could aid the small holder farmers in aligning to the necessary financial procedures and farming measures so as to expand their production capacity by obtaining the necessary knowledge, skills and attitude required to having ease of access to these resources through the use of these ICT tools (Sahlaney *et al*, 2015).

Table 4.20: Distribution showing utilisation of ICTs in facilitating access to credits and inputs

Facilitating access to credits and inputs						
ICT tools	Always	Sometimes	Rarely	Never	Mean	Rank
	(%)	(%)	(%)	(%)		
Mobile phone	73.90	18.80	3.00	3.70	2.81	1 st
Radio	49.70	32.70	9.10	8.50	2.24	2 nd
T.V	30.30	37.00	21.80	10.90	1.87	3 rd
Video	26.10	36.40	24.80	12.70	1.76	4 th
Internet	30.30	26.10	26.70	17.00	1.70	5 th
Computer	25.50	32.70	26.70	15.20	1.68	6 th
Camera	26.70	24.20	21.80	27.30	1.50	7 th
Audio Recorder	17.60	24.80	26.70	30.90	1.29	8 th
E mail	21.20	21.20	18.80	38.80	1.25	9 th
Projector	13.90	21.20	27.30	37.60	1.12	10 th
CD Rom	7.90	21.20	24.80	46.10	0.91	11 th
Scanner	7.90	5.50	10.90	75.80	0.45	12 th
Intercom	3.60	8.50	11.50	76.40	0.39	13 th
Fax	1.20	3.00	10.90	84.80	0.21	14 th
Grand mean					19.18	

Source: Field work (2017)

*where always = about 25 days in a month, sometimes = about 17 days in a month, rarely = about 10 days in a month and never represents not at all

Table 4.20.1: Disaggregated Level of utilisation of ICT tools in facilitating access to credits and inputs between respondents' from public and non-public organisations

Organisation	Category	Frequency	Percentage	Min. score	Max. score	Mean
Public	Low	61	49.20	0.00	48.00	18.75±8.56
	High	63	50.80			
Non-public	Low	18	43.90	0.00	40.00	20.41±8.58
	High	23	56.10			

Source: Field work (2017)

4.21: Utilisation of ICTs for assisting clients on business planning

Result from Table 4.21 shows that respondents used mobile phone mostly in assisting clients on business planning, which has a weighted mean score of 2.67. This is followed by radio ($\bar{x}=2.22$) and internet ($\bar{x}=1.92$). This shows that extension practitioners' uses mobile phone most to assisting their clients probably due to the level of accessibility and availability it gives to the target beneficiaries. This further shows that mobile phone was mostly used by respondents to help their farmers on business planning by relating improved knowledge and best practices on their farm business through this medium more frequently than other ICT tools. This implies that mobile phone serves as an essential tool in enhancing farmers' comprehension of current business strategies that can improve their farm production (Vignare, 2013).. The use of radio in assisting clients on business planning implies that radios exhibit wide applicability across geographical regions, especially to rural distant communities. While the use of internet in assisting clients on business planning reveals the versatility of the ICT tool in reaching target beneficiaries who are at distant shores or international borders (Yekinni, 2014). Also, fax was the least used ICT tool by respondents from public organisation. This reveals that the use of fax ($\bar{x}=0.22$) might not be appropriate to assist clients on business planning by the respondents.

The study further compartmentalised the respondents into those of public organisation and non-public organisations as regards the use of ICTs in assisting clients on business planning. Result from Table 4.21.1 showed the level of utilisation of ICTs in assisting clients on business planning between extension practitioners from public organisation and those from non-public organisations. Slightly over half of the respondents (54.00%) from public organisation fell within those with high level of ICT use, while 46.00% fell within those with low level of ICT use in assisting clients on business planning. Conversely, 53.70% of respondents from non-public organisations fell within those with high level of ICT use, while 46.30% of respondents fell within low level of ICT use in assisting clients on business planning. The slight difference exhibited by respondents from non-public organisations to that of the public showed both uses ICT tools adequately in assisting clients on business planning. This shows that extension practitioners may often require intensively educating and training the target audience on

how they can effectively manage their farm enterprise without experiencing loss of their farm produce (Vignare, 2013). Daily routines on farm management, feasibility studies and other ways of preventing glut on the farm could be well communicated through the ICT tools that are well available and accessible to the extension practitioners and their respective clientele.

Table 4.21: Distribution showing utilisation of ICTs in assisting clients on business planning

Assisting clients on business planning						
ICT tools	Always	Sometimes	Rarely	Never	Mean	Rank
	(%)	(%)	(%)	(%)		
Mobile phone	77.00	17.00	2.40	3.60	2.67	1 st
Radio	52.70	27.30	9.70	10.30	2.22	2 nd
Internet	35.20	34.50	17.60	12.70	1.92	3 rd
T.V	34.50	30.30	22.40	12.70	1.87	4 th
Video	33.30	28.50	24.80	13.30	1.82	5 th
Computer	30.90	30.90	26.10	12.10	1.81	6 th
Camera	27.90	27.90	22.40	21.80	1.62	7 th
Audio Recorder	25.50	27.30	23.00	24.20	1.54	8 th
E mail	20.00	32.10	22.40	25.50	1.47	9 th
Projector	19.40	28.50	26.70	25.50	1.42	10 th
CD Rom	13.30	19.40	27.90	39.40	1.01	11 th
Scanner	8.50	7.30	20.60	63.60	0.61	12 th
Intercom	3.00	10.30	9.70	77.00	0.39	13 th
Fax	1.20	3.00	12.70	83.00	0.22	14 th
Grand mean					20.59	

Source: Field work (2017)

*where always = about 25 days in a month, sometimes = about 17 days in a month, rarely = about 10 days in a month and never represents not at all

Table 4.21.1: Disaggregated Level of utilisation of ICT tools in assisting clients on business planning between respondents' from public and non-public organisations

Organisation	Category	Frequency	Percentage	Min. score	Max. score	Mean
Public	Low	57	46.00	0.00	36.00	20.33±8.47
	High	67	54.00			
Non-public	Low	19	46.30	3.00	39.00	21.59±7.48
	High	22	53.70			

Source: Field work (2017)

4.22: Utilisation of ICTs to conduct surveys, enumerations, monitoring and evaluation activities

Data from Table 4.22 shows that respondents use mobile phone ($\bar{x}=2.63$) most in conducting surveys, enumerations, monitoring and evaluation activities. This is followed by radio ($\bar{x}=1.93$) and video ($\bar{x}=1.91$). This implies that mobile phone tends to aid extension practitioners in eliciting prompt information that are research-based through this ICT tool. Moreover, it tends to be mostly used in assisting superior extension personnel in monitoring extension activities of the subordinates and lower staff cadre on the field. This implies that mobile phone tends to be a viable medium for quick assessment of farmers' activities where distance is barrier between farmers and extension workers (Vignare, 2013). Also, the use of radio and video in monitoring and evaluation shows that these ICT tools can be used to record extension activities being carried out by extension personnel for approval of carrying out extension activities by their superior staff as at when due. Also, fax ($\bar{x}= 0.13$) was the least ICT tool used by respondents from ADPs. This probably shows that fax might not be an essential tool that could be used in conducting surveys, enumerations, monitoring and evaluation activities of farmers by the respondents.

The study further classified the respondents into those of public organisation and non-public organisations as regards the use of ICTs in conducting surveys, enumerations, monitoring and evaluation activities. Result from Table 4.22.1 shows the level of utilisation of ICTs in conducting surveys, enumerations, monitoring and evaluation activities between extension practitioners from public organisation and those from non-public organisations. Almost half of the respondents (42.70%) from public organisation fell within those with high level of ICT use, while 57.30% fell within those with low level of ICT use in conducting surveys, enumerations, monitoring and evaluation activities. On the other hand, 68.30% of respondents from non-public organisations fell within those with high level of ICT use, while 31.70% of respondents fell within low level of ICT use in conducting surveys, enumerations, monitoring and evaluation activities. The significant difference observed in other organisations (BAT, JDPC and USAID) over the public organisation, shows that respondents from the former organisations tend to have better infrastructural ICT facilities that could enhance their

extension service delivery where and when necessary (BAT Report, 2015; JDPC Report, 2016). This could be probably achieved by the financial support that these other organisations are prone to receiving from their donors. This tends to enhance quick assessment of the rural populace through advanced technologies that could facilitate the respondents' access to farming activities of their clientele. (Bells et al, 2013).

Conclusively, data obtained from the overall mean as revealed in Figure 4 showed that extension practitioners engaged ICT tools most in raising awareness about opportunities ($\bar{x}=22.6$) for extension functions. While the least extension function they used ICT tools for is facilitating access to credits and inputs ($\bar{x}=19.2$). This reveals the important role ICT tool plays in extension service delivery to farmers by the respondents. It helps to sensitise the farmers about any new invention or innovation that can improve their standard of living and as such enhance their means of livelihood (Vignare, 2013). This implies that raising awareness about opportunities embraces facilitating transfer of knowledge among farmers and assisting clientele to have access to agricultural inputs, practices, services and markets as the case warrants through communication tools.

The extension function in which they rarely uses ICT tools for is “facilitating access to credits and inputs”. This implies that extension practitioners need to engage the use of multiple media in rousing the interest of their clientele towards this extension function. Moreover, combination of ICT tools for use of this extension function, will aid in captivating the senses of the audience and thus help the sensitisation activities of the respondents to be better achieved (Bells, 2016).

Table 4.22: Distribution showing utilisation of ICTs in conducting surveys, enumerations, monitoring and evaluation activities

Conducting surveys, enumerations, monitoring and evaluation activities						
ICT tools	Always (%)	Sometimes (%)	Rarely (%)	Never (%)	Mean	Rank
Mobile phone	72.60	19.50	6.10	1.80	2.63	1 st
Radio	40.00	27.30	18.20	14.50	1.93	2 nd
Video	32.10	38.20	18.20	11.50	1.91	3 rd
T.V	28.50	30.90	28.50	12.10	1.76	4 th
Computer	38.20	19.40	23.00	19.40	1.76	4 th
Camera	29.70	30.90	24.20	15.20	1.75	6 th
Internet	30.90	26.10	24.20	18.80	1.69	7 th
Audio Recorder	20.00	23.00	30.90	26.10	1.37	8 th
Projector	17.50	25.50	25.50	31.50	1.29	9 th
E mail	21.80	20.00	23.00	35.20	1.28	10 th
CD Rom	13.30	15.20	29.10	42.40	0.99	11 th
Scanner	8.50	5.50	16.40	69.70	0.53	12 th
Intercom	5.50	6.10	10.30	78.20	0.38	13 th
Fax	2.40	3.60	10.90	83.00	0.25	14 th
Grand mean					19.52	

Source: Field work (2017)

*where always = about 25 days in a month, sometimes = about 17 days in a month, rarely = about 10 days in a month and never represents not at all

Table 4.22.1: Disaggregated Level of utilisation of ICT tools in conducting surveys, enumerations, monitoring and evaluation activities between respondents' from public and non-public organisations

Organisation	Category	Frequency	Percentage	Min. score	Max. score	Mean
Public	Low	71	57.30	0.00	37.00	18.32±8.79
	High	53	42.70			
Non-public	Low	13	31.70	9.00	39.00	23.15±7.62
	High	28	68.30			

Source: Field work (2017)

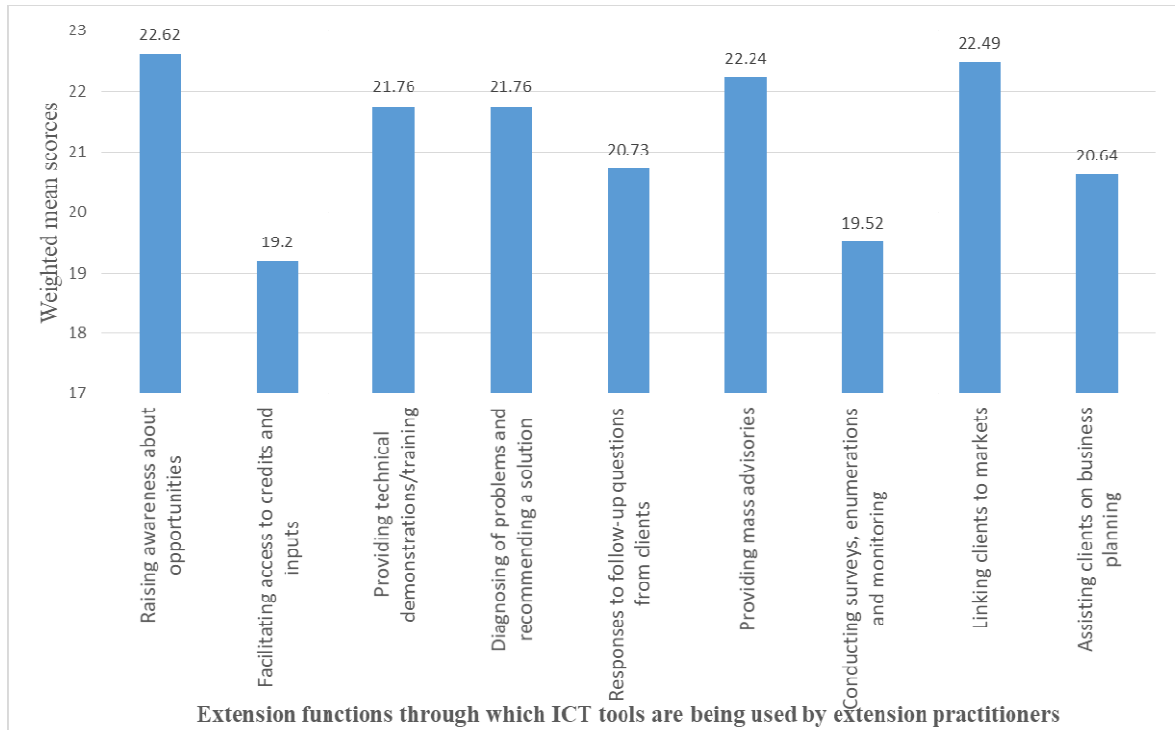


Fig 6: Distribution of respondents by use of ICTs for extension functions

Source: Field work (2017)

4.23 Hypotheses testing

This section reports the result of the analysis with which the hypotheses of the study were tested.

4.23.1: Test of relationship between selected personal and professional characteristics and use of information and communication technologies for public and non-public organisations

Result in Table 4.23.1 indicates that there were no significant relationship between use of information and communication technologies and selected personal characteristics of respondents from both public and non-public organisations. Such as sex ($\chi^2=0.006$; $p= 1.000$), marital status ($\chi^2=1.053$; $p= 0.407$), religion ($\chi^2=0.322$; $p= 0.668$), highest level of educational status ($\chi^2=6.641$; $p= 0.249$). This inferred that irrespective of the sex of the respondents, marital status, religion and highest level of educational status; the respondents' socio-economic characteristics do not really affect their use of ICTs in their extension duties. This is in tandem with the findings of Amusat *et al* (2013) which showed that researchers use of information technologies dissemination are apparently corrigible to a greater degree regardless of their socio-economic characteristics.

Data obtained from Table 4.23.1.2 reveals that there was a significant correlation between utilisation of information and communication technologies and years of professional experience ($r=0.811$; $p= 0.000$), while there were no significant relationship between use of information and communication technologies and other personal characteristics such as age of the respondents ($r=0.008$; $p= 0.921$), highest level of education ($r=0.013$; $p= 0.866$) in the study area. This shows that utilisation of information and communication technologies by extension practitioners from can be enhanced as their years of working experience increases. This may be as a result of improving their ICT skills in order to be more relevant in addressing the needs of their clients in the course of carrying out their extension duties effectively. This finding is supported by Kolawole *et al* (2016) who asserted that extension personnel years of working experience yields a greater influence on their use of communication technologies in a bid to scaling up their extension obligation rendered to their clientele

4.23.2: Linear regression analysis between selected personal and professional characteristics and use of information and communication technologies for public and non-public organisations

The regression result in Table 4.23.2 shows the professional characteristics and other variables that influenced the use of ICTs by respondents in public organisations. It revealed that three professional characteristics among other variables slightly influence ICT use among extension practitioners from public organisations with a value of 13% (R-square = 0.130). The results show that respondents' MSc educational qualification ($\beta = 0.035$; $\rho < 0.05$), years of professional experience ($\beta = 0.031$; $\rho < 0.05$) and grade level ($\beta = 0.013$; $\rho < 0.05$) contributed significantly to the use of information and communication technologies in public organisations. The finding correlates with Developing Local Extension Capacity, (2017) which revealed that the few extension personnel with higher educational qualification and advanced grade levels from government or non-government extension parastatals have the tendency of possessing a greater disposition to using ICT more in the course of performing their extension obligations. This finding is consistent with that of Olaolu, Agwu, Ivande and Olaolu (2018) who emphasised that higher or tertiary educational levels of public extension personnel might further play a major part in the extension personnel technology usage.

Furthermore, the regression analysis on Table 4.23.2.1 shows the professional characteristics and other variables that influenced the use of ICTs by respondents in non-public organisations. It also revealed that three professional characteristics among other variables slightly influence ICT use among extension practitioners from non-public organisations with a value of 47.8% (R-square = 0.478). The regression result shows that respondents' MSc educational qualification ($\beta = 0.017$; $\rho < 0.05$), years of professional experience ($\beta = 0.041$; $\rho < 0.05$) and grade level ($\beta = 0.001$; $\rho < 0.05$) contributed significantly to the use of information and communication technologies in non-public extension organisations. It further substantiates the findings from Agha, Ghangas and Chahal (2018) who buttressed that the increase in years of professional experience of extension officers might contribute to improving the usage of these communication technologies for their extension work. The finding also correlates with Developing Local Extension Capacity, (2017) which revealed that the few extension personnel with higher

educational qualification and advanced grade levels from government or non-government extension parastatals have tendency of possessing a greater disposition to using ICT effectively in their work.

Moreover, the summary of regression analysis on Table 4.23.2.2 shows the professional characteristics and other variables that influenced the use of ICTs by all the extension practitioners in the study area. It revealed that five professional characteristics among other variables slightly influences ICT use among extension practitioners in the study area with value of 31.6% (R-square=0.316). The regression result shows that respondents' HND educational qualification ($\beta = 0.002$; $\rho < 0.05$), BSc educational qualification ($\beta = 0.019$; $\rho < 0.05$), MSc educational qualification ($\beta = 0.017$; $\rho < 0.05$), years of professional experience ($\beta = 0.054$; $\rho < 0.05$) and grade level ($\beta = 0.000$; $\rho < 0.05$) contributed significantly to the use of information and communication technologies in non-public extension organisations. This finding substantiates with that of Kolawole, Isitor and Owolabi (2016) who established that as the years of professional experience of extension agents' increases, so does the tendency to improve their use of communication technologies in the course of disseminating their duties. Benjamin, Onu, Jungur, Ndaghu, and Giroh (2016) also emphasised that educational levels of extension personnel at BSc and HND with higher grade levels on their job might strongly influence extension personnel technology inclination and usage. The authors further corroborated that those extension personnel who possessed MSc educational level were most times often minimal compared with those who had BSc and HND but also had the tendency to affect technology usage for extension work.

Table 4.23.1: Chi-square analysis of relationship between selected personal and professional characteristics and use of information and communication technologies

Variable	Df	Chi-square (χ^2)	p-value	Decision
Sex	1	0.006	1.000	Not Significant
Marital status	1	1.053	0.407	Not Significant
Religion	1	0.322	0.668	Not Significant
Highest level of educational status	5	6.6641	0.249	Not Significant

Source: Field work (2017)

Table 4.23.1.2: Test of relationships between other personal and professional characteristics and use of ICT tools

Variables	r-value	p-value	Decision
Age of the respondents	0.008	0.921	Not significant
Highest level of education	0.013	0.866	Not significant
Years of professional experience	0.811	0.000	Significant

Source: Field work (2017)

Table 4.23.2: Linear regression analysis between other personal and professional characteristics and use of ICT tools in public organisation

Variables	Beta	t-ratio	p value	Remarks
(Constant)		3.346	0.002	
Age of the respondents (years)	-0.071	-0.350	0.727	NS
Male	0.017	0.172	0.863	NS
Married	-0.016	-0.153	0.879	NS
HND	-0.411	-1.851	0.067	NS
BSc	-0.399	-1.755	0.082	NS
MSc	-0.382	-2.131	0.035**	S
Years of Professional Experience (years)	0.465	-2.185	0.031**	S
Cadre/Grade level	-0.421	2.537	0.013**	S
Duty dissemination	-0.149	-1.530	0.129	NS
In-house training	0.104	1.108	0.270	NS

R=0.361, R-square=0.130, Adjusted R-square=0.053, df =123, F=1.695,

**Significant at 5%

Source: Field work(2017)

Table 4.23.2.1: Linear regression analysis between other personal and professional characteristics and use of ICT tools in non-public organisation

Variables	Beta	t-ratio	p value	Remarks
(Constant)		4.478	0.000	
Age of the respondents (years)	-0.320	-1.619	0.116	NS
Male	0.073	0.499	0.621	NS
Married	0.023	0.163	0.871	NS
HND	-0.198	-0.961	0.344	NS
BSc	-0.246	-1.100	0.280	NS
MSc	-0.175	-0.873	0.017**	S
Years of Professional Experience (years)	0.424	2.140	0.041**	S
Cadre/Grade level	-0.566	-3.850	0.001**	S
Duty dissemination	-0.153	-1.083	0.287	NS
In-house training	0.004	0.024	0.981	NS

R=0.692, R-square=0.478, Adjusted R-square=0.305, df=40, F=2.751,

**Significant at 5%

Source: Field work(2017)

Table 4.23.2.2: Test of relationships (Summary of linear regression analysis) between other personal and professional characteristics and use of ICT tools among the extension practitioners

Variables	Beta	t-ratio	p value	Remarks
(Constant)		6.706	0.000	
Age of the respondents (years)	-0.122	-0.993	0.322	NS
Male	0.028	0.393	0.695	NS
Married	0.041	0.532	0.595	NS
HND	-0.439	-3.195	0.002**	S
BSc	-0.340	-2.368	0.019**	S
MSc	-2.85	-2.419	0.017**	S
Years of Professional Experience (years)	0.241	1.931	0.054**	S
Cadre/Grade level	-0.517	-6.648	0.000**	S
Duty dissemination	-0.236	-1.042	0.306	NS
In-house training	0.087	1.234	0.219	NS

R=0.562, R-square=0.316, Adjusted R-square=0.271, df=164, F=7.112,

**Significant at 5%

Source: Field work(2017)

4.24: Test of relationship between access to communication tools and utilisation of information and communication technologies

Data from Table 4.24 shows that there is a significant relationship between access to information communication tools ($r=0.420$; $p=0.000$) and utilisation of communication technologies by extension practitioners in the study area. This implies that extension practitioners utilisation of communication tools is highly dependent on the degree of accessibility to these tools. This equally explains that for a tool to be accessible, shows that available tools are readily prone to use. Ease of access to each of these communication tools will facilitate the use of the technology effectively for dissemination of related agricultural information. This finding is coherent with the findings of Yekinni *et al* (2014) who ascertained that having more official access to communication technologies will increase the use of such technologies for extension delivery purposes.

Furthermore, result from Table 4.24.1 reveals that there was a significant relationship between access to information communication tools ($r=0.575$; $p=0.000$) and utilisation of communication technologies among respondents from public organisation; also there is significant relationship between access to information communication tools ($r=0.228$; $p=0.011$) and utilisation of communication technologies among respondents from non-public organisations. This substantiates the fact established above that extension practitioners' effective use of communication technologies irrespective of their organisations could be facilitated by their direct and easy access to these tools for maximum impact in their extension work.

Table 4.24: Correlation analysis between access to ICTs tools and utilisation of Information and Communication Technologies

Variables	r-value	p-value	Decision
Access to ICT tools	0.420	0.000	Significant

Source: Field work(2017)

Table 4.24.1: Correlation analysis between access to ICTs tools and utilisation of Information and Communication Technologies for public and non-public organisations

Access to ICT tools	N	r-value	p-value	Decision
Public	124	0.575**	0.000	Significant
Non-public	41	0.228**	0.011	Significant
Total	165			

**** Significant at 0.01**

Source: Field work (2017)

4.25: Test of relationship between constraints variables and utilisation of information and communication technologies.

The constraint variables in the study were constraints to access and use of ICTs. Results of the correlation analysis between constraints that limits access and their utilisation of ICTs as shown in Table 4.25 indicate that the level of information communication use was significant but inversely related to constraints that limits their access to communication technologies ($r = - 0.368$; $p = 0.000$). This suggests that as the constraints in the access to technologies increases, it reduces the respondents' use of communication technologies in their extension duties and vice versa. This is in tandem with the findings of Oladele, (2014) who found that a rise in the constraints that limits access to ICT tools will lower the use of ICTs by extension officers.

Also, results of the correlation analysis between constraints to use of technologies and their utilisation of ICTs as shown in Table 4.25 is ($r = - 0.468$; $p = 0.000$). This indicates that the level of utilisation of ICTs was significant but inversely related to constraints that limit their ICT use. This is in line with Omotesho, Ogunlade and Muhammed (2012) findings, which asserts that diverse constraints encountered by agricultural extension officers as regards ICT use will reduce the utilisation of these technologies by extension personnel in their disseminating activities.

Furthermore, data from Table 4.25.1 reveal constraints to access and use of information and communication technologies among extension practitioners from public organisation and non-public organisations. Result shows that extension practitioners from the public extension organisation were more constrained in access to (14.10 ± 3.17) and use of ICT tools (10.84 ± 3.30) compared to access (9.80 ± 5.25) and use of ICT tools (5.31 ± 5.08) among respondents from non-public organisations and were significant. This implies that extension practitioners from public organisation experiences more severe constraints in their organisation in accessing and using ICT tools for their extension work than those from non-public organisations. This tends to consequently limit the efficacy of using these ICT tools well in their disseminating activities (Oladele, 2015).

Moreover, result from Table 4.25.2 shows the test of relationships between constraints to access and use of information and communication technologies among extension practitioners from public organisation and non-public organisations. Result depicts that extension practitioners from the public extension organisation were not constrained in access to ICT tools ($r = -0.279$; $p = 0.077$) but were more constrained in use of ($r = 0.419$; $p = 0.006$) ICT tools and was significant. Conversely, those from non-public organisations were not constrained in access to ICT tools ($r = -0.099$; $p = 0.272$) as well as neither in their use of ICT tools ($r = 0.045$; $p = 0.617$) for their extension work. This implies that extension practitioners from public organisations experience greater restrictions in using ICTs efficiently as regards carrying out their extension obligations optimally.

Table 4.25: Correlation for test of relationship between constraints and use of ICT tools

Variables	r-value	p- value	Decision
Constraints that limits access to ICTs	-0.368	0.000	Significant
Constraints that limits use of ICT tools	-0.468	0.000	Significant

Source: Field work(2017)

Table 4.25.1: Mean Difference in Constraints to access and use of ICT tools between public extension organisation and non-public extension organisations

Variables	Category	N	Mean	Std. deviation	Std. error mean
Constraints to access to ICT tools	Non-public	41	9.805	5.249	0.819
	Public	124	14.105	3.174	0.285
Constraints to use of ICT tools	Non-public	41	5.317	5.076	0.793
	Public	124	10.839	3.296	0.296

Source: Field work(2017)

Table 4.25.2: PPMC relationship between constraints that limit access to and use of ICT tools by the extension practitioners and their utilisation of information and communication technologies in public and non-public organisations

Constraints to ICTs	N	r-value	p-value	Decision
accessibility				
Public	124	-0.279	0.077	Not Significant
Non-public	41	-0.099	0.272	Not Significant
Total	165			
Constraints to ICTs utilisation				
Public	124	-0.419**	0.006	Significant
Non-public	41	-0.045	0.617	Not Significant
Total	165			

**** Significant at 0.01**

Source: Field work (2017)

4.26: Test of relationship between extension practitioners' perception on ICT use and utilisation of information and communication technologies

Data shown on Table 4.26 reveals that there is a significant relationship between utilisation of information and communication technologies and extension practitioners' perception on information and communication technologies ($r = 0.265$; $p = 0.001$). This means that there is a direct relationship between extension practitioners' perception and technology utilisation. This finding can be explained by the fact that those who have favourable perception have the tendency of using it more than those who do not have favourable perception towards ICT use. This is in line with the findings of Birke, Lemma and Knierim (2018) who asserted that the favourable perception of extension personnel towards the use of ICTs greatly influenced their utilisation of these technologies for successful extension service delivery in Ethiopia.

Furthermore, result from Table 4.26.1 shows that there was no significant relationship between utilisation of information and communication technologies and extension practitioners perception on ICTs ($r = -0.123$; $p = 0.444$) among respondents' from public organisations. Alternatively, it further reveals that there is a significant relationship between utilisation of information and communication technologies and extension practitioners perception on ICTs ($r = 0.070$; $p = 0.001$) among respondents from non-public organisation. This implies that extension practitioners' positive disposition to the use of ICTs in non-public organisations tend to stimulate them better in rightly using these communication tools passionately for their extension work.

Table 4.26: Correlation analysis between extension practitioners' perception on ICT use and utilisation of information and communication technologies in Southwestern Nigeria

Variables	r-value	p-value	Decision
Index of Perception	0.265	0.001	Significant

Source: Field work(2017)

Table 4.26.1: PPMC relationship between extension practitioners' perception on the use of ICTs and their utilisation of information and communication technologies for public and non-public organisations

Perception	N	r-value	p-value	Decision
Public	124	-0.123	0.444	Not Significant
Non-public	41	0.070**	0.001	Significant
Total	165			

**** Significant at 0.01**

Source: Field work (2017)

4.27: Test of relationship between utilisation of information and communication technologies for extension delivery and knowledge of ICTs of the respondents'

Results in Table 4.27 reveal that there is a significant relationship between utilisation of communication technologies and knowledge of information and communication technologies by extension practitioners ($r=0.216$; $p=0.005$). This finding can be further explained by the respondents' overall level of knowledge on ICT use, which revealed that their knowledge level on the use of communication tool is considerably high. This infers that the extension practitioners', who have moderate knowledge on ICT use, are using it well in their disseminating activities as a result of having ease of access to these tools. Their knowledge of ICTs also tends to be fuelled by the positive disposition and attitude they display towards the use of ICTs. This is in tandem with the findings of Dishant *et al*(2018), who unveiled that the considerable knowledge exhibited by extension officials towards ICT use may be as a result of their frequent use and right disposition to the use of the tools during the course of discharging their extension duties.

Moreover, data from Table 4.27.1 shows that there was no significant relationship between utilisation of communication technologies and knowledge of information communication technologies among extension practitioners ($r= 0.032$; $p=0.722$) from the public organisation. On the other hand, it further reveals that there is a significant relationship between utilisation of communication technologies and knowledge of information communication technologies among respondents ($r= 0.308$; $p= 0.050$) from non-public organisations. This implies that extension practitioners' from non-public organisations portend to have substantial knowledge on these communication tools and as such spurs their intensity to using these tools well for their extension activities.

Table 4.27: Correlations analysis between knowledge of ICT and use of ICT tools

Variable	r- value	p- value	Decision
Knowledge of use of ICT	0.216	0.005	Significant

Source: Field work(2017)

Table 4.27.1: PPMC relationship between extension practitioners' knowledge of ICTs for dissemination activities and their utilisation of information and communication technologies in public and non-public organisations

Knowledge	N	r-value	p-value	Decision
Public	124	0.032	0.722	Not Significant
Non-Public	41	0.308*	0.050	Significant
Total	165			

* Significant at 0.05

Source: Field work(2017)

4.28: Test of Difference in the use of information and communication technologies among extension practitioners of different organisations

Table 4.28 shows the overall index of use of information communication technologies as ($t= 157174.881$; $f= 43.019$). This shows generally that they have significant differences in the use of ICTs among extension practitioners of the various organisations. The significant difference observed from the one way (ANOVA) Table reveals that there are actually real differences between and within the various extension organisations in the use of communication technologies. This implies that the extension practitioners from the various organisations uses different technologies in varying capacities at which their organisations are duly equipped to transfer timely, sensitive and up to date agricultural information to farmers. This however has its own multipliers' effect in each of the organisations little way in assisting the farmers' enterprises.

Data obtained from Table 4.28.1 reveals that there was significant difference in technology use among extension practitioners from British American Tobacco and Justice Development and Peace Commission ($t= 78.114$; $p=0.001$). Looking at the significant difference that exists between British American Tobacco and Justice Development and Peace Commission (JDPC) over the use of information and communication technologies, it shows that practitioners from the former organisation (BAT) have various ICT tools that are more readily available and accessible to them for extension delivery purpose. This implies that extension practitioners from British American Tobacco uses these tools more for their disseminating activities and this have a way of influencing the knowledge, attitude and skills of new agricultural innovations being communicated to their target clientele. This finding is buttressed during an IDI who report:

“the ICT tools used for extension work in this organisation are basically sponsored from our foreign base and as such make them not only available but also functional in order for our administrative staff and field workers to be able to utilise them efficiently in disseminating relevant information and innovations to our clientele” (A senior executive supervisor, BAT, Iseyin, Oyo state).

This further explains how their ease of access to using these tools could equally have a way of influencing the extension practitioners' knowledge of use for each of these tools efficiently in their extension work. This probably makes their clientele more

enlightened and receptive on latest agricultural innovations which consequently would be reflected on significant improvement of their agricultural enterprise.

Moreover, data obtained from Table 4.28.2, reveals that there was significant difference in technology use among extension practitioners from British American Tobacco and Agricultural Development Programme ($t= 181.60036$; $p =0.000$). The significant difference observed in British American Tobacco organisation and Agricultural Development Programme may have risen as a result of frequency of use of the various technologies by extension practitioners from the former organisation (BAT) during the course of discharging their extension duties. The frequency of utilisation must have been enhanced based on the degree of availability and accessibility of the tools by the practitioners in their extension work (DLEC, 2017). This implies that extension practitioners from British American Tobacco (BAT) wields a greater influence on their target clientele as they have unrestricted access to using these tools in communication relevant information and skills to their farmers. This however qualifies them to having greatest penetrating ICT-influence in their extension service delivery (BAT Report, 2016).

Data obtained from Table 4.28.3 also shows that there was significant difference in technology use among extension practitioners from British American Tobacco and United State Agency for International Development ($t= 201.345$; $p=0.000$). The significant difference observed in British American Tobacco organisation and United State Agency for International Development clearly gives credence to the extension practitioners from (BAT) to having adequate exposure to information and communication training, as well as improving their capacity building on ICT use from time to time. This assertion was corroborated byan IDI who report:

“we ensure that from the management level, trainings on ICT are carried out on a consistent basis for our extension personnel in order to know how to operate new communication tools through various capacity building platforms. This will enable them pass useful agricultural innovations and messages across to the farmers appropriately” (A senior extension manager from BAT, Iseyin, Oyo state).

This implies that extension practitioners from British American Tobacco (BAT) level of exposure to these ICT tools tend to have a direct influence on their use of the

tools in their disseminating activities, which makes their impact to their target audience much more pronounced over other extension organisations.

Table 4.28.2 further reveals that there was a significant difference between Justice Development and Peace Commission and Agricultural Development Programme ($t = 103.487$; $p = 0.000$). This infers that practitioners from the former organisation have better access to available ICT tools which places them on a greater platform in utilising these technologies to promote ideal agronomic practices to their clients. This was further corroborated by IDI report:

‘we present those ICT tools that we need for extension work to our funders the ‘Germany association of bishops’ who supply the fund to purchase those ICT tools we have itemised on our extension schedule list. As a result this enables us to acquiring many ICT tools with ease of access for effective extension service delivery (head of program for Integrated Development Program in JDPC, Ibadan, Catholic arch diocese of Ibadan).

This implies that extension practitioners from Justice Development and Peace Commission higher advantage on use of ICT tools over those from ADPs tends to reflect in the substantial change in production activities of farmers the former organisation reaches out to over those farmers being attended to by the latter organisation (JDPC, 2015).

Result obtained from Table 4.28.2 likewise showed that significant difference existed in the use of technologies between Justice Development and Peace Commission and United State Agency for International Development ($t = 123.321$; $p = 0.000$). This shows that JDPC has a stronger enhancement in the use of ICTs probably due to frequent usage of these tools during the course of rendering their extension obligations. This assertion was corroborated by the IDI who report:

‘we engaged most of this ICT tools during our regular visits most times on weekly, fortnightly, monthly and quarterly basis in creating awareness, training our clients, as well as through our enlightenment workshops for communities and religious leaders (A senior diocese supervisor, Ekiti Catholic ArchDiocese, Ekiti State).

Lastly, the slight difference existing between Agricultural Development Programme and United State Agency for International Development on the use of communication technologies may have risen from low availability of ICT tools and lower

level of accessibility to ICT use by the former organisation. This must have been as a result of the latter organisation engagement of ADPs staff and tools to carry out their extension activities. This finding is buttressed during an IDI who report:

'we engaged the service of extension agents in ADPs because of our foreign status, therefore this leads to recruiting service providers by partnering with them and public organisations in order to reach the grassroots' farmers. Hence the need to leverage on established ADP structures (head of extension service provider for USAID)

This finding further falls in line with that of Ocen, (2015), which revealed that non-public providers often engage the services of public staff so as to execute their extension goals.

Furthermore, results from Table 4.28.2 shows the degree of utilisation of technologies by the various organisations in the course of rendering their extension duties: This means British American Tobacco uses ICT most with the mean of 252.18, Justice Development and Peace Commission with the mean of 174.07, Agricultural Development Programme with the mean of 70.58 and United State Agency for International Development with the mean of 50.74.

This underlines the fact that the utilisation of technologies for extension delivery purposes was most used by the British American Tobacco (BAT) organisation. This implies that different organisations fund extension service delivery differently. British American Tobacco (BAT) which is a private organisation tends to take the lead in the utilisation of technologies. This probably may be due to ease of access to ICT tools by the staff as a result of the technologies decentralisation within the organisation which will automatically enhance its use better. This finding is in line with Ocen, (2015) who emphasised that increase in utilisation of ICTs in any organisation is dependent on how accessible and decentralise it is throughout the system for the employees use. Thus, this gives the BAT organisation a higher edge over other organisations to equip their organisation and staff with up to date technologies, proper trainings and improved capacity building on using these technologies effectively in their extension work (BAT focus report, 2017).

Justice Development and Peace Commission (JDPC) comes next in the utilisation of technologies and is also a faith-based private organisation but non-profit-oriented. This organisation also has a strong financial back-up from their foreign base and is well financially supported in their extension delivery services. This support has been evident in personnel quality access to communication tools which has enhanced the utilisation of these tools for their extension work (JDPC Annual report, 2015). This finding supports the work of Ocen, 2015 who found out that a greater number of Non-Governmental Organisations have easier access to technology use based on their strong financial base.

This is followed by Agricultural Development Programme (ADP) which is a public organisation, owned and fully funded by the state government. It has been observed that accessibility to ICT tools in the public extension organisations has always been very poor (Ocen, 2015). This probably must have risen due to the governments' inconsistent funding to this organisation. As a result it has affected poor infrastructural set-up of these technologies in the organisation over the years and has contributed to the poor use of technologies by staff of this organisation in rendering their extension duties effectively (Nigerian Agricultural Sector Review Report, 2018).

United State Agency and International Development (USAID) is an inter-governmental organisation that is funded by a foreign donor to low income countries like Nigeria. They work in close collaboration with the ADPs by using their already established structures with the secondment of the ADP staff to the organisation (DLEC, 2017). The weak structure encompasses low extension practitioners, few available and accessible ICT tools. As a result, their technology utilisation was the least among the four organisations in relation to their extension service delivery.

In summary, it has been observed that the rate at which each organisation fund their extension service delivery will affect the degree of utilisation of communication tools by extension practitioners of each of these organisations.

Moreover, data from Table 4.28.3 shows the test of difference in the respondents' use of information and communication technologies between public and non-public extension organisations. Results revealed that use of ICTs was higher in non-public extension organisations (34.80 ± 11.45) than public extension organisation (29.65 ± 11.10) and was significant. This further corroborates the findings shown above from (BAT focus

report, 2017) and (JDPC Annual report, 2015) for each of the extension organisations that are non-public in having ease of access to using these ICT tools in their extension work. This implies extension practitioners from non-public organisations utilise ICT tools efficiently and optimally in their extension delivery service.

Conclusively, data from Table 4.28.4 shows that significant difference existed in the use of technologies between public organisations and non-public organisations ($t=6.313$; $p=0.000$). This implies that the use of communication technologies is strongly emphasised and employed by extension practitioners from non-public organisations probably as a result of having positive disposition, knowledge, unrestricted access to these tools over those from public organisations. This automatically could lead to appreciable usage of these tools in their disseminating activities over respondents from the public organisations.

Table4.28: ANOVA for test of difference in the use of information and communication tools among extension practitioners of different organisations

	Sum of Squares	Df	Mean squares	F	p-value
Between Groups	471524.64	3	157174.881	43.019	0.000
Within Groups	588229.52	161			
Total	105954.2	164			

Source: Field work(2017)

Table 4.28.1: Post-Hoc Test for one-way ANOVA for test of difference in ICT use

Organisations (I)	Organisations (J)	Mean difference	p-value	Decision
BAT	JDPC	78.11376	0.001	Significant
BAT	ADP	181.60036	0.000	Significant
BAT	USAID	201.43500	0.000	Significant
JDPC	ADP	103.48660	0.000	Significant
JDPC	USAID	123.32124	0.000	Significant
ADP	USAID	19.83464	0.320	Not significant

Source: Field work(2017)

Table 4.28.2: Ordering of Index of use of ICT tools among the various organisations

Organisations	N	Mean	Rank	Std.dev.
BAT	10	252.18	1 st	90.92
JDPC	21	174.07	2 nd	108.89
ADP	124	70.58	3 rd	47.00
USAID	10	50.74	4 th	23.40

Source: Field work(2017)

Table 4.28.3: Test of difference in the use of ICTs between extension practitioners from public and non-public organisations

Organisation	N	Mean	Std. deviation	Std. error
Public	124	29.65	11.10	0.99
Non-public	41	34.80	11.45	1.79

Source: Field work (2017)

Table 4.28.4: Independent sample t-test of respondents' ICT utilisation between public and non-public extension organisations

	Organisation	N	Mean	Standard Deviation	Mean difference	t- value	p- value	Decision
Utilisation	Public	124	0.199	0.108	0.081	6.313	0.000	Significant
	Non-Public	41	0.119	0.054				

Source: Field work (2017)

4.29: Test of Difference in knowledge of information and communication technology use among extension practitioners of different organisations

Statistics shown from Table 4.29 indicated that there were no significant differences in knowledge of technology use among extension practitioners from the various extension organisations is ($f = 2.34$; $p = 0.075$).

However, data arranged in Table 4.29.1 shows that there were significant differences in knowledge of technology use between the extension practitioners from: British American Tobacco and those from Agricultural Development Programme ($\bar{x} = 3.482$; $p = 0.045$); as well as extension practitioners from British American Tobacco and United State Agency for International Development ($\bar{x} = 4.700$; $p = 0.046$); while there are no significant differences in knowledge of communication technologies use among the following extension practitioners of extension organisations: British American Tobacco and Justice Development and Peace Commission ($\bar{x} = 1.509$; $p = 0.454$); Justice Development and Peace Commission and Agricultural Development Programme ($\bar{x} = 1.973$; $p = 0.112$); Justice Development and Peace Commission and United State Agency and International Development ($\bar{x} = 3.190$; $p = 0.115$); Agricultural Development Programme and United State Agency and International Development ($\bar{x} = 1.217$; $p = 0.480$).

The inference from these findings shows that respondents from British American Tobacco agency were more knowledgeable in technology use over respondents' from Agricultural Development Programme. The difference must have risen from the higher exposure rate on technology usage for extension work, regular trainings on technology use, as well as increasing staffs' capacity building. This probably must have been influenced by the management structure of the organisation. This must have been fuelled by frequent visits of foreign professional expertise, in upgrading their staff knowledge on current and new research technology - based innovations through the ICT platforms (BAT Report, 2017).

The findings also show that respondents from British American Tobacco agency were more knowledgeable in technology use over respondents' from United State Agency for International Development. This is in line with a report obtained from IDI dialogue that:

“USAID organisation do give opportunities once a while for capacity building in the area of ICT utilisation especially to service providers they collaborate with from other agricultural agencies in the form of training on how to utilise these ICT tools for extension purposes, but most of these tools cannot be personalised for a longer period of time except within those period of training. That means provision of these ICT tools is mainly by proxy (A supervisor service provider, USAID, Ibadan, Oyo state).

This infers that having adequate knowledge of ICT tools is not enough to equip the extension practitioners from all the agricultural extension agencies in communicating agricultural information efficiently, but rather having continual and uninterrupted access to utilising it makes the knowledge much more productive for their extension work. This assertion is supported by Yekinni *et al.*, (2014) who suggested that extension practitioners’ knowledge level can be enhanced when their relevant organisations rises up to the task of empowering and facilitating the use of technologies perpetually, as well as having the right disposition to technology use in relation to the staff extension work over a long period of time.

Moreover, Table 4.29.2 shows the level of knowledge exhibited by the respondents from each of the extension organisations as BAT ($\bar{x} = 26.70$), JDPC ($\bar{x} = 25.19$), ADP ($\bar{x} = 23.22$) and USAID ($\bar{x} = 22.00$) on technology use in their extension work.

British American Tobacco organisation had the highest knowledge mean on ICT use. This implies that the slight differences exhibited by this organisation may have risen from the greater use of communication tools that are most available and accessible. British American Tobacco’s level of knowledge above others is an indication of being knowledgeable on how to put to use each of these tools. This helps them to have a greater impact as regards their proficiency for extension activities (BAT, 2015).

For Justice Development and Peace Commission, the level of knowledge rating them as next to the highest might be as a result of previous experiences acquired through frequent use of these tools overtime in carrying out their extension work (JDPC, 2015).

Agricultural Development Programme ranked third in the level of knowledge of ICT tools. This must have risen as a result of low exposure to ICT trainings, as well as inadequate access to using the available tools during extension work. This will automatically slow down the rate at which these tools are being frequently used in their

extension delivery activities (Nigeria Agricultural Sector Performance Review Report, 2018).

While the organisation which had the lowest mean on knowledge of ICT use was the United State Agency for International Development. This implies that communication tools available to extension practitioners from this organisation are probably few and most times used within a specific period of time. Most of these tools might not be accessible to the extension providers in reaching their clientele for extension service delivery within a particular period of time. As such, this pre-empt them to having minimal exposure to learning more on technology use in carrying out their extension work within their organisation (USAID, 2017).

Conclusively, result from Table 4.29.3 shows that there was no significant difference in the level of knowledge exhibited by the respondents from public and non-public organisations ($\bar{x} = 1.563$; $p = 0.102$). This implies that extension practitioners' degree of knowledge on ICT use was quite negligible between the two categories of extension organisations. This could probably be due to the high penetration rate of ICTs in these recent times, thereby exposing these practitioners more to acquiring the necessary skills needed for their personal use or other agricultural-related activities.

Table 4.29: Summary of knowledge of use of ICTs by extension practitioners

	Sum of Squares	Df	Mean squares	F	Not significant
Between Groups	192.935	3	64.312	2.348	0.075
Within Groups	4410.459	161	27.394		
Total	4603.394	164			

Source: Field work(2017)

Table 4.29.1: One way ANOVA for test of Difference in knowledge of information and communication technology use among extension practitioners of different organisations

Organisations (I)	Organisations (J)	Mean difference	p-value	Decision
BAT	JDPC	1.50952	0.454	Not Significant
BAT	ADP	3.48226	0.045	Significant
BAT	USAID	4.70000	0.046	Significant
JDPC	ADP	1.97273	0.112	Not Significant
JDPC	USAID	3.19048	0.115	Not Significant
ADP	USAID	1.21774	0.480	Not Significant

Source: Field work(2017)

Table 4.29.2: Summary of Post Hoc knowledge of use of ICT tools among the various extension organisations

Organisations	N	Minimum score	Maximum score	Mean	Std.dev.
BAT	10	14.00	33.00	26.70	5.29
JDPC	21	15.00	35.00	25.19	4.64
ADP	124	8.00	33.00	23.22	5.26
USAID	10	12.00	33.00	22.00	5.98

Source: Field work (2017)

**Table 4.29.3: Independent sample t-test of respondents' knowledge on use of ICTs
between public and non-public extension organisations**

	Organisat ion	N	Mean	Standard Deviation	Mean difference	t-value	p- value	Decision
Knowledge	Public	124	23.218	5.261	1.563	1.646	0.102	Not Significant
	Non- Public	41	24.780	5.299				

Source: Field work (2017)

4.30: One way ANOVA for test of Difference in perception to use of information and communication tools among extension practitioners of different organisations

Statistics from Table 4.30 shows that there was significant difference in perception on use of technologies among extension practitioners from the various extension organisations ($f = 3.290$; $p = 0.022$).

Furthermore data from Table 4.30.1 reveals that there was significant difference in perception on use of communication tools by extension practitioners from Justice Development and Peace Commission organisation and Agricultural Development Programme ($\bar{x} = 8.142$; $p = 0.008$); also there was significant difference between Justice Development and Peace Commission and United State Agency for International Development ($\bar{x} = 11.690$; $p = 0.018$).

The inference from these findings shows that respondents from Justice Development and Peace Commission organisation have a better perception on technology use over respondents' from Agricultural Development Programme. The difference could be as a result of the relevant and up to date information gotten from JDPC organisation on technology use. This will enhance the extension practitioners' sensitivity to ICT use as well as heighten their favourable disposition to the use of technologies in their extension work (JDPC, 2015).

The findings also show that respondents from Justice Development and Peace Commission organisation have a better perception on technology usage over respondents' from United State Agency for International Development. This may be due to their high level of knowledge in ICT usage. This will consequently affect their favourable perception on ICT use in the course of disseminating their extension duties. Their favourable perception will increase their utilisation of ICT tools in achieving specific extension functions distinctively when in touch with their clientele (Bells, 2015).

Moreover, Table 4.30.2 shows the differences in perception on technology use among extension practitioners from the various organisations as JDPC ($\bar{x} = 86.19$), BAT ($\bar{x} = 83.60$), ADP ($\bar{x} = 78.05$) and USAID ($\bar{x} = 74.50$).

Justice Development and Peace Commission organisation has the highest perception mean score relative to technology usage. This implies that the slight

differences exhibited by this organisation may have risen from the level of knowledge gotten on the use of technologies over time in their extension activities. This probably informs the management and employees inclination to favourable disposition of ICT use which may consequently transform into positive perception to using these ICT tools well in the course of discharging their extension obligations to their clientele (Birke, Lemma and Knierim, 2018).

British American Tobacco organisation perception mean score rates them as next to the highest. This might be an indication of a closer forum of technology use between the management and personnel of the organisation in meeting the need of their clientele based on previous IDI report from this study. This may lead to knowledge increase among practitioners to using these tools in their work. Also, this may consequently foster a stronger cohesion to using ICT tools better and thus helps in sharpening their perception on ICT use in their extension work (Birke *et al*, 2018).

Agricultural Development Programme organisation ranked third in their perception to technology use. This may be a resultant effect of low accessibility of ICT tools in this organisation. This is in line with a report from IDI meeting:

“ICT tools available for extension personnel in this organisation are not many, the few ones that are functional are mostly used by our senior staff for administrative functions within the organisation with little or no access to use by extension personnel on the field” (a block extension supervisor, ADP, Abeokuta).

This tend to project extension practitioners used by this organisation with a fair knowledge on ICT use, which could have a minimal level of influence on their perception on ICT use in their extension services. This also confirms the assertion of Ocen (2015) that low knowledge of ICT is a major determinant to low perception of technology usage.

Finally, the United State Agency for International Development organisation had the lowest perception mean score to use of ICTs. This implies that inadequate interception between the management and staff of this organisation in using ICTs to meet the need of their clientele for a prolonged period of time is very low. This finding is further buttressed during an IDI that:

“USAID as a foreign body does not work directly with extension agents but rather go through service providers that the extension agent is already affiliated to. As a result, these ICT tools are being used by service providers to intimate the

extension agents on relevant technology dissemination but not empowered by the extension agents(A supervisor service provider, USAID, Ibadan, Oyo state).

This might be as a result of the weak structure of personnel used, which may influence their low knowledge on ICT use as well as poor perception to using ICTs in their extension work (DLEC, 2017).

In conclusion, results from Table 4.30.3 shows that there was significant difference in perception on use of communication tools by extension practitioners from Public and non-public organisations ($\bar{x} = -5.599$; $p=0.016$). This implies that extension practitioners' from non-public organisations seem to have had a better perception on ICT use probably as a result of their timely exposure to recent communication technologies as well as adequate exposure to ICT trainings that will enhance their use of such technologies in performing their extension duties.

Table 4.30: Summary of index of perception of respondents' use of ICT tools

	Sum of Squares	Df	Mean squares	F	Sig
Between Groups	1605.146	3	535.049	3.290	0.022
Within Groups	26181.848	161	162.620		
Total	27786.994	164			

Source: Field work(2017)

Table 4.30.1: One way ANOVA for test of Difference in perception on use of ICT tools and the extension practitioners of different organisations

Organisations (I)	Organisations (J)	Mean difference	p-value	Decision
BAT	ADP	5.55161	0.187	Not Significant
BAT	USAID	9.10000	0.113	Not Significant
JDPC	BAT	2.59048	0.598	Not Significant
JDPC	ADP	8.14209	0.008	Significant
JDPC	USAID	11.69048	0.018	Significant
ADP	USAID	3.54839	0.399	Not Significant

Source: Field work(2017)

Table 4.30.2: Ordering of Index of perception on ICT tools among the various extension organisations

Organisations	N	Minimum score	Maximum score	Mean	Std.dev.
JDPC	21	67.00	102.00	86.19	12.33
BAT	10	63.00	100.00	83.60	11.25
ADP	124	52.00	104.00	78.05	12.67
USAID	10	51.00	104.00	74.50	15.81

Source: Field work(2017)

**Table 4.30.3: Independent sample t-test of respondents' perception on use of ICTs
between public and non-public extension organisations**

	State	N	Mean	Standard Deviation	Mean difference	t-value	p-value	Decision
Perception	Public	124	68.756	13.767	-5.599	2.432	0.016	Significant
	Non- public	41	74.355	12.439				

Source: Field work(2017)

The study established the extent of use of information and communication technologies for agricultural extension service delivery in public and non-public organisations in southwestern Nigeria. Results from the research showed that extension practitioners from public organisations had a mean age of 39.91 ± 8.33 years. Majority of the respondents (41.9%) falls within the highest age range of 33 and 42 years. Most of the respondents were males (79.0%) and majority were married (76.6%). It was observed that 40.3% of the respondents possessed HND qualification. Also, results showed that 66.9% of respondents' fell within the range of 1 to 10 years of professional experience. It also found out that 38.7% of extension practitioners had more exposure on ICT training received within their organisations. Furthermore, the study also revealed that extension practitioners from non-public organisations had a mean age of 40.44 ± 10.20 years. Majority of the respondents (41.5%) falls within the highest age range of 33 and 42 years. Most of the respondents were males (78.0%) and majority were married (82.9%). It was observed that 38.7% of the respondents possessed BSc qualification. Also, results showed that 70.7% of respondents' fell within the range of 1 to 10 years of professional experience. It also found out that 53.7% of extension practitioners had more exposure on ICT training received within their organisations. Summarily, the respondents personal and professional's distribution showed that most respondents (41.6%) fall between the age range of 33 and 42 years with an overall mean age of 40.0 ± 8.0 years. Majority of the respondents were males (78.8%), most were married (78.2%) with a mean of 1.2 ± 0.4 . It was observed that the mean value for highest level of educational qualification indicated 9.9 ± 7.9 ; with 41.2% of the respondents possessing BSc qualification. A mean of 3.2 ± 1.6 was attributed to the respondents' years of professional experience with 67.7% of the respondents falling within the range of 1 to 10 years of professional experience. The mean value for exposure received on ICT training by the extension practitioners indicated 3.2 ± 1.6 and 42.5% of the respondents had in-house exposure of ICT training within their various organisations.

Findings revealed 50.0% of respondents from public organisation fell within those with high level of knowledge and low level of knowledge concurrently. Whereas 68.3% of respondents from non-public organisations fell within those with high knowledge, while 31.7% of respondents fell within those with low level of knowledge of ICTs. The

study revealed that the most available ICT tools to the extension practitioners were phone (98.2%), computer (91.5%), email (91.5%), camera (90.3%) and the least available ICT tool is fax machine (3.6%). Also, respondents' level of available ICT tools was high with the distribution of 65.5% and mean of 9.82 ± 2.35 . Findings further revealed that 61.3% of respondents from public organisation fell within those with high level of availability of ICT tools, while 78.0% of respondents from non-public organisations fell within those with high level of available ICT tools.

Most ICT tools accessible to the extension practitioners in the study were mobile phone (90.3%), camera (60.0%), and radio (55.2%). Moreover, the level of access in the use of ICTs revealed that 60.5% of respondents from public organisation fell within those with high level of access to ICT use, while 39.5% fell within those with low level of access in the use of ICT. On the other hand, 73.2% of respondents from non-public organisations fell within those with high level of access in the use of ICT, while 26.8% of respondents fell within low level of access on ICT use.

The study showed the order of utilisation of ICT tools in relation to frequency of use as mobile phone, radio, internet, computer, camera, e-mail and t.v, with the level of use of ICT tools as low (70.9%) and with mean value of 93.5 ± 80 . Furthermore, 82.3% of respondents from public organisation fell within those with low level of use of ICT tools, while 63.4% of respondents from non-public organisations fell within those with high level of use of ICT tools.

It revealed that interrupted power supply ($\bar{x}=1.92$) was the major constraint to respondents' access to ICT tools while acceptable usage policy ($\bar{x}=1.35$) was the least constraint faced by respondents from public organisation respectively. While low financial resources ($\bar{x}=0.82$) was the major constraint to respondents access to ICT tools, while interrupted power supply ($\bar{x}=0.43$) was the least constraint to respondents' access to ICT tools faced by respondents from non-public organisations. Findings further revealed the level of constraints to ICT access for extension practitioners from public organisation as 64.50% , whereas 75.60% of respondents from non-public organisations fell within those with low level of constraints to ICT. Also, specific constraints to respondents' access to ICT tools were identified for public and non-public organisations.

Specific constraints to ICT use were lack of financial resources ($\bar{x}=1.89$) was the major constraint to respondents' use of ICT tools while gender restriction ($\bar{x}=0.73$) was the least constraint faced by respondents from public organisation. Low level of computer education ($\bar{x}=0.93$) was the major constraint to respondents use of ICT tools, while gender restriction ($\bar{x}=0.37$) was the least constraint faced by respondents' from non-public organisations in the use of ICTs. Findings further revealed that 58.10% of respondents fell within high level of constraint to ICT use from public organisation while 75.60% of respondents from non-public organisations fell within those with low level of constraints to ICT use.

CHAPTER FIVE

5.0 SUMMARY CONCLUSION AND RECOMMENDATION

5.1 Summary of major findings of the study

Agricultural extension service in Nigeria has gradually evolved through various stages. It has passed through the conventional method of extension officers visiting farmers on farms to organising farmers into viable groups and lately to using communication technologies in impacting the necessary knowledge, attitude and skills of current agricultural innovations to the farmers.

However, there has been a continuous dearth of extension personnel in relation to the increasing number of farm family ratio due to the current economic crisis in the nation (NAERLS, 2015). As a result of this, it has necessitated the greater urgency in maximising and efficiently utilising the available communication technologies in the various agricultural extension organisations (Lwoga, Stilwel and Ngulube, 2011). This is to assist in duplication of efforts of the few extension personnel on ground in order to aid prompt information delivery and knowledge sharing among farmers, extension practitioners and other stakeholders in the agricultural sector (Yekinni, 2011).

Potential for the development of ICTs has been greatly heightened by the improvement in Nigeria's tele-density (a measure of penetration of telephone lines within a territory) since the turn of the century. The country's tele-density which was 0.4% in 1999 increased to 107% by 2015 (NCC, 2016). As a result of this, Nigeria is well positioned to using Information and Communication Technologies for its development pursuits. This increase in Nigeria tele-density has a spiraling effect on agricultural extension service delivery in Nigeria through the use of technologies by extension practitioners from the various agricultural extension organisations. Even though agricultural extension practitioners in Nigeria differ in capacity and potentials on the basis of organisation they work for (Madukwe, 2006).

Also, there has been a dearth of data on the extent to which these ICT tools are being used for in their overall extension delivery activities by extension practitioners from the various agricultural extension based organisations, necessitated the need for this study. It is within this context that this study seeks to ascertain the extent of use of ICTs by the extension practitioners of the various extension organisations for agricultural information delivery activities. For the purpose of this study, a number of specific research objectives as well as the major objective were developed with appropriate variable that could link with the utilisation of extension practitioners' use of ICTs with special reference from reliable literatures and theories. This study therefore specifically ascertained the extent of use of ICTs by the extension practitioners of the various extension organisations for agricultural information delivery activities in the study area. Other objectives were that it described the respondents personal and professional attributes of the respondents' in the area surveyed, determined the levels of respondents' expertise in using ICTs for their disseminating activities, determined the numerous ICT resources in southwest Nigeria available and accessible to the respondents', found out the purpose to which the practitioners are using each of the ICT tools in their extension work, checked out what unique extension delivery roles the extension practitioners use in their disseminating activities, determined to what degree to the various ICT tools are deemed relevant for their disseminating activities, identified the extension strategies employed by the different categories of practitioners, examined the practitioners view about the use of ICTs in their dissemination activities, assessed the restrictions in their extension duties that hinder their access and use of ICTs.

Moreover, a number of research hypotheses were specified and verified in null form. These were designed to test significant connection between respondents' utilisation which stands as the dependent variable and their access to ICT tools, constraints that limits their access, extension practitioners' perception and knowledge. Test of differences in their use of ICT, knowledge of use of ICTs as well as their perception on use of ICTs were also carried out.

A conceptual framework postulating a link of relationship among the diverse independent variables and how these linkages have the tendency to influence utilisation of ICTs was established. The conceptual framework was well established in connection with

theoretical propositions gathered from literatures reviewed so as to validate the interconnectedness that exists among the variables. This research reviewed three theories that were relevant to the utilisation of ICTs. Cognisant areas covered on this research study in relation to the use of ICTs for agricultural extension delivery encompasses historical emergence of agricultural extension in Nigeria, current management of public extension delivery and other major actors in Nigeria, emergence of ICTs in agricultural service, extension delivery strategies of extension practitioners' constraints limiting extension practitioners use of ICTs, extent to which ICT tools were deemed relevant by the practitioners and the extension service delivery organisations in southwest Nigeria.

The study was carried out in south western Nigeria. Lagos, Osun, Oyo, Ogun, Ondo and Ekiti states comprises the Southwestern zone with a population of 27,511,992 inhabitants (Federal Republic of Nigeria Official Gazette, 2007). The high concentration of NGOs and agricultural extension organisations interested in agricultural extension services justifies the choice of the area for the study. The study population comprises of extension practitioners rendering extension service delivery from public organisation (ADP) and non-public organisations which include the following: private organisation (BAT), Non- Governmental Organisation (JDPC) and inter-governmental organisation (USAID) in the study area. Multistage sampling procedure was used to select 165 respondents from four states Oyo, Ondo, Ekiti and Ogun States were purposively selected due to presence of notable Public Extension Organisations (PEO) and Non-Public Extension Organisations (NPEO). Selection of extension practitioners' was based on a three stage multi stage sampling procedure with level of purposiveness.

For non-public organisations, the first stage involved purposive selection of the states where the agricultural extension arms of each organisation were operational. For BAT (Oyo state), USAID (Oyo and Ondo states) and JDPC (Oyo, Ekiti and Ogun states). The second stage involved purposive selection of the zones where the extension outreaches of these agricultural extension organisations were operationally based, for BAT: Oyo state (Iseyin zone), USAID: Oyo state (Ibadan and Oyo zones), and Ondo state (Owo and Ikare zones), JDPC: Oyo state (Ibadan and Oyo zones), Ekiti state (Ekiti zone) and Ogun state (Abeokuta and Ijebu-ode zones). While the third stage involved the ascertaining the number of extension practitioners' in each organisation and total

selection of all. Using total sampling, all extension practitioners in British American Tobacco (BAT), United State Agency for International Development (USAID) and Justice Development and Peace Commission (JDPC) were selected to give a total of 41 respondents for NPEO i.e.(a sample selection of 10, 10, 21 extension practitioners' from BAT, USAID and JDPC were selected from each agricultural extension organisations respectively). While from Agricultural Development Programmes of selected states, 124 respondents were randomly sampled to represent Public Extension Organisation (PEO). The first stage involved simple random sampling of four states (Oyo, Ondo, Ekiti and Ogun states) out of the six states that makes up the southwest geopolitical zone of Nigeria. The second stage involved the random selection of the zones from the selected states by sampling 50% of the zones within each state. The third stage involved ascertaining the actual number of extension agents from the organisation by obtaining a list of all their extension agents in the agency. The fourth stage involved simple random sampling of 30% of the extension agents was drawn from each of the selected zones (i.e.124 respondents were drawn from ADP in the 4 states). Therefore a grand total of 165 extension practitioners from the four various organisations was subsequently interviewed across the four organisations.

Quantitative data collection was done through well designed questionnaires, while in-depth interview was gathered from key informants in the various organisations to support the quantitative data collected. Quantitative data were presented using means, charts, and percentages with qualitative data supporting the description of what obtains on the use of ICTs for each of these organisations. Also, test of hypotheses was done using relevant analytical tools for each of these hypotheses such as linear regression, Pearson Product Moment Correlation (PPMC), Analysis of Variance (ANOVA) as well as Test of Difference (t-test).

5.2 Conclusion and implications of findings

The major findings from this study have been summarised as a reflective conclusion as shown below:

1. The extension practitioners' most notable years of professional experience predisposes them to being more ICT-inclined in the use of ICYs for their extension

work. This tend to make them highly relevant in disseminating agricultural information effectively and promptly irrespective of dearth of extension personnel in their various organisation.

2. The two highest educational qualifications which are HND and BSc portends to be viable platforms for employment entry into the public and non-public organisations by extension practitioners for optimum performance in their extension work.
3. Extension practitioners' exposure to ICT training (especially in-house training) within the non-public organisations contributed greatly to using these technologies effectively in their extension work compared with respondents from public organisations. The frequency of trainings received on use of ICTs in their extension organisations will automatically translate into better utilisation of these ICT tools as regards their extension work.
4. Extension practitioners from public organisations exhibited moderate knowledge on ICT use, while those from non-public organisations reflected a greater knowledge on ICT use. The greater knowledge exhibited on the use of ICTs by extension practitioners tend to emanate from the frequency of ICT trainings received on the job.
5. Extension practitioners from public organisations had lesser access to ICTs than those from non-public organisations. The minimal access to using ICTs on their job limits the use of these tools for effective extension delivery. Restricted access to use of ICTs stems up majorly from interrupted power supply in public organisation, while low financial resources played an insignificant role in extension practitioners' access to ICT tools from non-public organisations.
6. Extension practitioners from public organisations used lesser of ICTs than those from non-public organisations. Most extension practitioners from public organisations used ICT less as a result of poor financial resources in setting up standard infrastructural ICT facilities by their extension organisations.
7. Utilisation of ICT tools across the various organisations was greatly influenced by ICT tools available and accessible to extension practitioners in their extension organisations. Extension practitioners from public organisations had lesser

number of ICT tools available and accessible to them compared with those from non-public organisations. This greatly inhibit the use of ICTs for valuable extension delivery to their clientele.

8. Extension delivery strategies commonly used across the various organisations were the farmers' field school, demonstration plots and individual follow up. This has proved to be a commonly adopted strategy as a result of its participatory nature by extension practitioners from both organisations.
9. Interrupted power supply was the most prominent constraint that limited extension practitioners' access to ICTs in public organisations while low financial resources was the major constraint that limited respondents access to ICTs in non-public organisations regard their extension duties.
10. Lack of financial resources was the most prominent constraint that limited respondents' use of ICTs in public organisation while low level of computer education was the most conspicuous constraint that limited the use of ICTs by extension practitioners from non-public organisations in the study area.

5.3 Recommendations

The following suggestions were made based on findings from this study.

1. Accessibility of ICT tools is very paramount to the disseminating activities of extension practitioners in all the various agricultural extension organisations. Therefore ICT tools like computer, projectors, intercom, scanners, CD ROM, audio recorder and the likes should be made readily accessible by the organisational management of public organisations to their extension practitioners. This could be done by ensuring that consistent supply of electricity is made available to accessing these ICT tools for their extension work. For example construction of high-voltage solar generating power could conveniently substitute the use of generators in public organisations by the state management.
2. Utilisation of ICT tools in relation to the frequency of use should be greatly encouraged and increased among the extension practitioners of the varied organisations by inspiring the respondents to increase the duration of use for each of the ICT tools. With special reference to extension practitioners from the public

organisations, this can be achieved by ensuring that the level of availability and accessibility of respondents' to these ICT tools is essentially high. This could be achieved by increasing staff emoluments at the end of the month and also increase field allowance package of staff in order to motivate extension practitioners better in using these tools more while carrying out their extension obligations.

3. Perception of extension practitioners can be greatly enhanced by ensuring that respective agricultural extension service organisations organise more or frequent in-house trainings on the benefits of ICT use in relation to their extension work. Also, experts in communication technology can be engaged to train the extension practitioners from public organisations in particular on diverse use of ICTs relative to their disseminating activities.
4. Knowledge level of extension practitioners can be improved upon by organising ICT-based agricultural extension workshops by their various agricultural extension organisations. This practically obtains for extension practitioners' from public organisations, by collaborating with agricultural-ICT experts at the international and national level in enlightening them with regards to dissemination roles. This will help build on the rudimentary knowledge acquired on technology use and enable the extension practitioners to be more relevant and deeply effective in rendering qualitative extension service delivery with each of the ICT tools
5. Agricultural Extension Organisations can improve their utilisation of ICTs more with regards to dissemination purposes by ensuring that their clientele gives appropriate positive feedback of the agricultural innovation being disseminated to them through these tools. This will encourage consistent adoption of subsequent innovations by their clientele and full consolidation of using these technologies well for dissemination purposes.
6. Extension practitioners should be funded consistently by private organisations operators and most especially those extension practitioners from the public organisations should be more funded on a consistent basis by the federal government and state governments in order for extension practitioners from the

public level to have full and unrestricted access to relevant ICT facilities that could motivate them towards optimum productivity.

7. In-depth interview with the various supervisors from non-public organisations (especially BAT and JDPC organisations) revealed that they have a strong ICT-based platform where members of staff are trained in accessing the tools for extension work. This should be encouraged by other agricultural extension organisations especially from the public organisations (ADPs) by equipping their establishment with these ICT facilities and empowering their extension personnel for optimum performance in their dissemination activities.

5.4 Contribution to knowledge

1. The study documented the personal and professional characteristics like sex, exposure received on ICT training and years of professional experience of extension practitioners to the use of ICTs for agricultural extension service delivery.
2. The study provided quantitative data on the levels of knowledge exhibited by extension practitioners from public and non-public extension organisations on the use of ICT in the study area.
3. The study investigated the communication tools available and accessible to extension practitioners and further provided the level of accessibility exhibited between the public organisation and non-public extension organisations in the study area.
4. The study ascertained the extent to which ICT tools are being utilised by extension practitioners, as well as the provided the level of utilisation between the public organisation and non-public extension organisations in the study area.
5. The study ascertained the purpose to which each of the ICT tools are being used by the extension practitioners in their extension work.
6. The study investigated how each ICT tools are being used to achieving various extension functions between public and non-public organisations.

7. The study determined perception of extension practitioners to the utilisation of ICTs as well as exhibited the perception levels of extension practitioners from public and non-public organisations.
8. The study ascertained the extension delivery strategies exhibited by extension practitioners from the various extension organisations in the study area.
9. The study established the constraints that limit their access to and use of ICTs by respondents in the study area and further provided the level of constraints to access and use of ICT between public and non-public extension organisations.

5.5 Areas of further research

1. The role of information and communication technology in integrating current agricultural innovations between extension practitioners in research institutes and private organisations in Nigeria.
2. Proclivity of extension delivery strategies towards information and communication technology utilisation among extension practitioners in establishing adopted innovations in agricultural extension in Nigeria.
3. Determinants of accessibility and utilisation of information and communication technology facilities by extension practitioners and farmers in Nigeria.
4. Evaluation of the access to and utilisation of information and communication facilities among extension practitioners in south east of Nigeria.

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**DEPARTMENT OF AGRICULTURAL EXTENSION AND RURAL
DEVELOPMENT, UNIVERSITY OF IBADAN, IBADAN
QUESTIONNAIRE ON UTILISATION OF INFORMATION AND
COMMUNICATION TECHNOLOGIES FOR AGRICULTURAL EXTENSION
SERVICE DELIVERY IN PUBLIC AND NON-PUBLIC ORGANISATIONS IN
SOUTHWESTERN NIGERIA**

State: _____ **Organisation:** _____

Personal characteristics

1. Age: _____
2. Sex: Male (), Female ()
3. Marital Status: Married (), Single (), Widow (), Divorced ()
4. Religion: Christianity (), Islam (), Traditional (), Specify others:

5. What is your highest level of educational qualification? OND (), HND (),
BSc (), MSc (), PhD ()

Professional characteristics

6. Years of professional experience: _____
7. Cadre/grade level: _____
8. Duty in the organisation: Administrative (), Dissemination (), Research (),
Specify others
9. Does your duty involve activities that require the use of ICTs? Yes (), No ()
10. What kind of training have you been exposed to on ICT? Degree programme (),
Diploma (), Intensive course (), In-house training (), Certificate course ()

Levels of knowledge in the use of ICTs for Extension Activities

11. Kindly respond to the following as much as you know
 - i. Which of the following computer device cannot be used to save video file: CD
ROM (), DVD (), memory card (), flash drive ()
 - ii. Which of the following is not a video format : MP4 (), AV1 (), MPEG (),
MP3 ()
 - iii. Video contains the following data except: pictures (), sound (), none of the
above (), all of the above ()
 - iv. You can tune to a channel using the following menu function except: Auto tuning
(), Manual tuning (), Press search on the remote channel (), Assign number to
channel ()
 - v. The following can be done to improve the picture and sound quality of scrambled
TV channels: Fine tuning (), Re-adjusting of TV antenna (), Setting picture
quality (), Adjust image contrast (), All of the above (), None of the above ()
 - vi. One of the following is used as a smart TV platform: Android (), Samsung (),
Panasonic (), LGTV ()
 - vii. Radio knob is used for the following: Tuning to desired frequency (), Powering
the radio (), checking radio connection (), all of the above ()
 - viii. Common frequencies used in radios include all but one of the following: FM (),
SW (), AM (), AF ()

- ix. Radio dial and knob are one and the same: Yes (), No ()
- x. Mobile phone operating system include the following except: Android (), Apple ios (), Windows (), Tablet ()
- xi. Internet connection strength on phone is usually indicated by all of these except: “G”(), “H”(), “E”() and “I”()
- xii. You can go to any of the following to download extra application for phone, except: Play store (), Windows store (), Apple store () and Market store ()
- xiii. All of these are internet search engines except: Ask (), Bing (), Yahoo (), Google () and Outlook ()
- xiv. Which of the following is not a popular social network technique used for spreading information on the internet: Tagging (), Hash tag (), Sharing (), Viewing ()
- xv. The following are examples of social media apps popularly used for information dissemination except: Yahoo (), Facebook (), LinkedIn (), WhatsApp (), Twitter ()
- xvi. Which of the following is not used as a component of a computer system? Hard disk (), Memory (), CD Rom (), Fax ()
- xvii. Computer can be used for the following except: Word processing (), Graphic processing (), Image processing (), Virus processing ()
- xviii. The following are used as input devices in a computer system except: Keyboard (), Mouse (), Monitor (), Joystick ()
- xix. A tape recorder can easily record any message with ease by pressing the play button and record button simultaneously: Yes (), No ()
- xx. The efficiency of having a well recorded message using a tape recorder involves noise reduction by fine tuning the volume moderately: Yes (), No ()
- xxi. A tape recorder can be powered by using any of these except: Alternate current (), Batteries (), Solar energy (), Ultimate power ()
- xxii. What do you do to make an object to be captured larger when using a camera: Zoom out (), Zoom in (), Moving closer ()
- xxiii. What do you do to make the object to be captured smaller when using a camera? Zoom in (), Zoom out (), Move back ()
- xxiv. Image quality of a camera is measured in: Pixel (), Decibel (), Flop ()
- xxv. The following can replace the work of a CD rom in a computer except: Flashdrive (), Diskette (), Memory card (), Joystick ()
- xxvi. CD rom can be used for all of these except: Video (), Audio (), Infographics (), all of the above (), none of the above ()
- xxvii. One of the following easily corrupts a CD rom: Heat (), Water (), Sharp objects (), Virus ()
- xxviii. Intercom equipment are usually powered: Per device (), Centrally (), Regionally (), None of the above ()
- xxix. Intercoms are usually used for communication within the following spectrum: Intra-organisations (), Inter-city (), Inter-state (), Inter-organisation ()
- xxx. Credit card can be loaded on the intercom: Yes (), No ()
- xxxi. The projector can be used to magnify the following except: Slide shows (), Video (), Audio (), Infographics (),

- xxxii. The following cables can be used in connecting a projector to a source: HDMI (), AV cable (), all of the above (), None of the above ()
- xxxiii. The following affects the size of the projected image: Proximity to the screen (), settings (), original size of the image (), all of the above ()
- xxxiv. Unwanted malicious email are usually located in which folders: Inbox folder (), Sent folder (), Spam folder (), Trash folder()
- xxxv. When sending electronic mails out, what do you click? Inbox folder (), Spam folder (), Compose (), Draft folder ()
- xxxvi. When sending e-mail to people and you want to copy others as well that are not part of your recipients but wish to notify them, which of these do you click? Bcc (), Cc ()
- xxxvii. A fax machine does the following except: Scanning (), Transmitting (), Printing (), Traversing ()
- xxxviii. A fax machine uses one of the following component to transmit documents: Telephone line (), Internet (), Radio (), Intranet ()
- xxxix. The fax machine can only be used to send documents within an organization: True (), False ()
 - xl. Scanner can be used to scan the following except: documents (), pictures (), charts (), audio()
 - xli. Scanner is an input device of a computer system: True (), False ()
 - xlii. A scanner can scan documents that are only in black and white: Yes (), No ()

D. ICT tools available and accessible to the various extension practitioners

12. Which of the following ICT tools are available and accessible in your organisations?

Availability of ICT tools			Accessibility of ICT tools		
ICT tools	Available	Not available	Very accessible	Rarely accessible	Not accessible
Video					
T.V					
Radio					
Mobile phone					
Internet					
Computer					
Tape recorder					

Camera					
CD-Rom					
Intercom					
Projectors					
E-mail					
Fax machine					
Scanner					
Specify others					

E. Utilisation of ICT tools for extension purposes

13. For what purpose and to what extent do you use the following ICT tools for the specific extension delivery activities?

Documentation purpose				
ICT tools	Always	Sometimes	Rarely	Never
Video				
T.V				
Radio				
Mobile phone				
Internet				
Computer				
Audio recorder				
Camera				
CD – ROM				
Intercom				
Projector				
E-mail				
Fax				
Scanner				
Dissemination purpose				
ICT tools	Always	Sometimes	Rarely	Never
Video				
T.V				
Radio				

Documentation purpose				
ICT tools	Always	Sometimes	Rarely	Never
Mobile phone				
Internet				
Computer				
Audio recorder				
Camera				
CD – ROM				
Intercom				
Projector				
E-mail				
Fax				
Scanner				
Information gathering purpose				
ICT tools	Always	Sometimes	Rarely	Never
Video				
T.V				
Radio				
Mobile phone				
Internet				
Computer				
Audio recorder				
Camera				

Documentation purpose				
ICT tools	Always	Sometimes	Rarely	Never
CD – ROM				
Intercom				
Projector				
E-mail				
Fax				
Scanner				

F. Utilisation of ICT tools in for extension functions

14. To what extent do you use the following ICT tools for the listed extension functions?

Linking clients to market				
ICT tools	Always	Sometimes	Rarely	Never
Video				
T.V				
Radio				
Mobile phone				
Internet				
Computer				
Audio recorder				
Camera				
CD-ROM				
Intercom				
Projector				

E-mail				
Fax				
Scanner				
Raising awareness about opportunities				
ICT tools	Always	Sometimes	Rarely	Never
Video				
T.V				
Radio				
Mobile phone				
Internet				
Computer				
Audio recorder				
Camera				
CD – ROM				
Intercom				
Projector				
E-mail				
Fax				
Scanner				
Providing technical demonstration/training				
ICT tools	Always	Sometimes	Rarely	Never
Video				

T.V				
Radio				
Mobile phone				
Internet				
Computer				
Audio recorder				
Camera				
CD-ROM				
Intercom				
Projector				
E-mail				
Fax				
Scanner				
Diagnosis of problems and recommending a solution				
ICT tools	Always	Sometimes	Rarely	Never
Video				
T.V				
Radio				
Mobile phone				
Internet				
Computer				
Audio recorder				
Camera				

CD – ROM				
Intercom				
Projector				
E-mail				
Fax				
Scanner				
Responses to follow up questions from clients				
ICT tools	Always	Sometimes	Rarely	Never
Video				
T.V				
Radio				
Mobile phone				
Internet				
Computer				
Audio recorder				
Camera				
CD – ROM				
Intercom				
Projector				
E-mail				
Fax				
Scanner				

Providing mass advisories				
ICT tools	Always	Sometimes	Rarely	Never
Video				
T.V				
Radio				
Mobile phone				
Internet				
Computer				
Audio recorder				
Camera				
CD – ROM				
Intercom				
Projector				
E-mail				
Fax				
Scanner				
Facilitating access to credits and inputs				
ICT tools	Always	Sometimes	Rarely	Never
Video				
T.V				
Radio				
Mobile phone				
Internet				

Computer				
Audio recorder				
Camera				
CD – ROM				
Intercom				
Projector				
E-mail				
Fax				
Scanner				
Assisting clients on business planning				
ICT tools	Always	Sometimes	Rarely	Never
Video				
T.V				
Radio				
Mobile phone				
Internet				
Computer				
Audio recorder				
Camera				
CD – ROM				
Intercom				
Projector				
E-mail				

Fax				
Scanner				
Conducting surveys, enumerations, monitoring and evaluation activities				
ICT tools	Always	Sometimes	Rarely	Never
Video				
T.V				
Radio				
Mobile phone				
Internet				
Computer				
Audio recorder				
Camera				
CD – ROM				
Intercom				
Projector				
E-mail				
Fax				
Scanner				

G. Relevance of ICT tools to agricultural information dissemination strategies

15. To what extent are these ICT tools relevant in extension service delivery?

Note: VR-Very Relevant, Somehow Relevant-SR and Not Relevant-NR

Statements on Relevance of ICT tools	VR	SR	NR
How relevant is the use of video in linking farmers to markets?			
How relevant is the use of video in raising general awareness of opportunities related to agriculture?			
How relevant is the use of video in diagnosing problems and recommending a solution?			
How relevant is the use of T.V for responding to follow up questions raised by clients?			
How relevant is the use of T.V in providing mass advisories?			
How relevant is the use of radio in facilitating access to credits and inputs?			
How relevant is the use of radio in linking farmers to markets?			
How relevant is the use of radio in providing technical information on demonstration training to farmers?			
How relevant is the use of video in training farmers for farmers' field school?			
How relevant is the use of T.V in demonstration shows for farmers?			
Is the use of mobile phones relevant in facilitating access to credits and inputs?			
Is the use of mobile phone relevant in conducting surveys, enumerations, monitoring and evaluation?			
Is the use of mobile phone relevant in raising general awareness of opportunities?			
Is the use of internet relevant in providing mass advisories?			
Is the use of internet relevant in raising general awareness of			

Statements on Relevance of ICT tools	VR	SR	NR
agricultural related opportunities?			
How relevant is the use of fax in diagnosing problems and recommending a solution?			
How relevant is the use of fax in assisting with business planning?			
How relevant is the use of computer in providing technical information?			
How relevant is the use of projectors in providing mass advisories for extension delivery?			
How relevant is the use of tape recorder in raising general awareness of opportunities to farmers for extension delivery purposes?			
How relevant is the use of digital camera in getting important images relating to agriculture for extension delivery purposes?			
How relevant is the use of CD-ROM in storing data in form of text, graphic and sound for extension delivery purposes?			
How relevant is the use of scanners in transferring images from books or photographs into digital format computer can read for extension purposes?			
How relevant is the use of e mail in sending messages, links, documents and attachments for extension delivery purposes?			
How relevant is the use of intercom in communicating and receiving feedback from the receiver to audience for extension delivery?			

H. Extension delivery strategies used by development practitioners of the extension organisations

16. To what extent do you use the following strategies in your extension delivery activities?

Strategies	Always	Sometimes	Rarely	Never
Farmer Field Schools, Demonstration plots and Individual follow up				
Lead farmers and specialised training				
Credit schemes & saving initiative				
Value chain & market integration				
On-farm trials				
Field days				
Group extension methodologies				
On research station workshop				
Training and visit				
Others				

I. Perception of ICT Use

17. Kindly respond to the following statements about the use of ICTs in extension delivery activities as they apply to you?

Statements	SA	A	U	D	SD
Relevant information can be gotten through the use of video					
Extension work can be slowed down if internet are not easily accessible					
The use of camera in extension work does not provide full information on agricultural messages					

Statements	SA	A	U	D	SD
Use of radio in extension delivery is not educative					
Use of ICT tools among various extension organisations promotes competition					
Use of ICT tools for extension delivery use improve linkages between research and extension					
The use of ICT tools does not help in diagnosing problems of farmers					
Use of ICT tools does not assist in recommending a solution to farmers' problems					
Use of ICT tools allows response to follow up questions raised by farmers					
Extension delivery using ICT tools helps in facilitating access to credits and inputs by farmers					
Extension delivery using ICT tools helps in raising general awareness of opportunities available to farmers					
Use of ICT tools for extension delivery could lead to poor capacity building among extension organisations					
Use of ICT tools in extension work can never increase priority areas of extension coverage					
Use of ICT tools discourages extension services to be directed at specific needs of the people					
The use of ICT tools for extension delivery could be complicated in its operational use while delivering agricultural related messages to farmers					
ICT use could make agricultural extension message delivery become more effective to farmers					
Use of ICT tools for extension delivery could lead to slow rate of adoption of agricultural messages					
The use of ICT tools for training farmers in extension					

Statements	SA	A	U	D	SD
delivery does not provide adequate advisory support					
Use of ICT tools in extension work reduces the participation of extension personnel					
Use of ICT tools for extension work will break gender restriction in receiving agricultural messages					
Empowerment of extension organisations and farmers is not enabled through the use of ICT tools					
Timely information are not obtainable to farmers through the use of ICT tools for extension delivery					
The quantity of agricultural messages that can be passed to farmers through the use of ICT tools is very limited					
The quality of agricultural information that can be passed to farmers cannot be readily accessible to farmers through the use of ICT tools					

SA – Strongly Agree, A – Agree, U – Undecided, D – Disagree and SD – Strongly Disagree

J. Constraints limiting the access and use of ICT

18. In what way do the following constraint items limit your access to ICT tools in your duties?

Constraints to Access of ICT	Serious constraint	Mild constraint	Not at all
Interrupted power supply			
Lack of financial resources			
Lack of internet facilities			
Lack of relevant infrastructures			
Acceptable usage policy			
High cost of hard ware			
Lack of locally relevant content and			

services			
Non-affordability			
Lack of technology appropriateness			
Others			
Constraints limiting the Use of ICT	Serious constraint	Mild constraint	Not at all

19. In what way do the following constraint items limit your use of ICT tools in your duties?

Constraints limiting the Use of ICT	Serious constraint	Mild constraint	Not at all
Lack of financial resources			
Lack of technical know-how			
Low level of computer education			
Gender restriction			
Inadequate investments			
Inconsistence in salary payment			
Inherent need in capacity building			
Difficulty in integrating with existing media			
Others			

K. Utilisation of ICT tools in relation to period of use and duration of use

20. To what extent do you use the following ICT tools for your duties?

ICT Tools	Frequency of Use				Duration of Use (average no. of hours)
	7 to 4 times a week	3 to 2 times a week	Once a week	Not at all	
Video					
T.V					
Radio					
Mobile phone					
Internet					
Computer					
Audio recorder					
Camera					
CD-Rom					
Intercom					
Projector					
E-mail					
Fax					
Scanner					

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SOUTHWESTERN NIGERIA**

State: _____

Organisation: _____

IN- DEPTH INTERVIEW GUIDE FOR KEY INFORMANTS

1. What are the roles played by your organisation in improving extension practitioners' level of knowledge on ICTs for their extension work?

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2. Are there any organisational policies guiding the use of ICTs efficiently as regards the access and use of ICTs in your organisation?

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3. How accessible and available are the relevant ICT tools used by extension practitioners' for extension work in your organisations?

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4. What are those things that can influence the perception of extension practitioners in your organisation on the use of ICTs such that can affect their extension work?

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5. Give an overview of things that could impede the use of ICTs in your organisation.
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6. Give an overview of things that could limit the extension practitioners' access to ICTs most in your organisation.
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7. How do you make up for your extension practitioners' deficiency in ICT use for optimal performance of their extension activities?
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8. What triggers the efficient use of ICTs in your organisation for impactful extension work?
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9. How often do you get financial support from your organisation in securing relevant ICT infrastructural facilities which could be suitable for extension service delivery purpose.
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10. On what extension basis do you use those available ICTs for in your organisation?
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11. Kindly state any other information that could reveal utilisation level of ICT tools in your organisation

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12. Can you state for what purpose do extension practitioners from your organisation uses ICT tools categorically for and the reason for using it for such purposes?

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