The Impact of Training and Visit System of Agricultural Extension on Farmers' Adoption of Cereal Production Technologies for Sustainable Development

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ABSTRACT

The study determined the impact of Training and Visit (T&V) system of agricultural extension services on farmers' adoption of cereals production technologies for sustainable development in Zangon-Kataf Local Government Area (LGA). Two hundred (200) questionnaires were administered to respondents in the study area. The outcome revealed that there was improvement in living standards of farmers due to their participation in Training and Visit (T&V) activities. This manifested in farmers acquiring luxury goods like Radio, Television, Video and other related electronics (33.0%) as well as a durable asset like Tractor (0.5%). When the hypothesis was subjected to test, it revealed a significant relationship as $F_{cal.}$(5.36) was greater than $F_{tab.}$(3.03). Hence, it was concluded that cereal crop farmers in the area were aware (30.7%) and had adopted (24.4%) the technologies they felt would sustain their means of livelihoods. The researchers concluded that there was improvement in living standards of farmers because of their participation in Training and Visit (T&V) activities in the study area. One of the suggestions raised was that, the participatory approach of Training and Visit (T&V) system be sustain through linking agricultural extension and research for appropriate cereal crop technologies.

Keywords: Impact, Training and Visit (T&V), agricultural extension, technologies.

1. INTRODUCTION

Many approaches to agricultural extension services delivery abound in various countries of the world. Williams (2003) reported that it is against this back-drop that the Food and Agricultural Organization (FAO) Programme Committee at its 58th session in 1987 emphasized the importance of appraising the various extension approaches worldwide vis-à-vis their cost effectiveness, reliability, sustainability and capacity to reach the target audience. He as well saw approach as the essence of an agricultural extension system. It is the style of action within an extension system. The approach of an extension system embodies the philosophy of the system. It guides the structure, leadership, programme, resources and linkages of a given extension system. Negal (1997) and Ekpere (2014) revealed the following dominant extension delivery approaches that are practice all over the world: general Agricultural Extension Approach (GAEA), Commodity Specialized Approach (CSA), Training and Visit system (T&V), Agricultural Extension Participatory Approach (AEPA), Project Approach (PA), Farming Systems Development Approach (FSDA), Cost Sharing Approach (CSHA) and Educational Institution Approach (EIA). These approaches can be characterized by following dimensions: assumptions, purposes, control of prgrammes, nature of the personnel (staff-cliental ratio), implementation techniques and methods.

In 1972, Torimiro and Okorie (2008) recalled that the Federal Government of Nigeria negotiated a World Bank Loan to first establish three (3) pilot enclave Agricultural Development Projects (ADP) in Funtua (Kaduna State), Sokoto (Sokoto State) and Gombe (Bauchi State). Also in the late 1970s, six (6) more enclave ADPs in Ayangba (Benue State), Lafia (Plateau State), Bida (Niger State), Ilorin (Kwara State), Shaki (Oyo State) and Ekiti Akoko (Ondo State) were established. The central theme of these projects was to transfer the already developed agricultural technologies to the majority of the farmers in the farming families through the Extension Workers [Agricultural Extension Society of Nigeria (AESON), 2007].

Today, following the tremendous success recorded in the pilot projects, ADP has adopted Statewide (Ebehard, 2003). The structure of ADP is organized on a single management system that operates with a high degree of autonomy from the parent Ministry of Agriculture, including development of work plans and budgetary control (Williams, 2003; Johnson, 2003). This arrangement facilitates setting of clear and objective annual targets for the project as a whole, as well as for separate programmes of the ADP (Rasheed, 2003). The approach also enables the projects to concentrate efforts in the areas relevant to food production and farm income generation, thereby providing parameters for assessment of the programmes' impact amongst the clientele (Tonah, 2015). The features of the ADPs have popularized the ADPs as an effective institutional framework for achieving agricultural development in Nigeria (Beno and Boxter, 1994; Arene, 2004).

Before the World Bank launched and sponsored the Training and Visit (T&V) agricultural extension system operated by the Agricultural Development Projects (ADP), it used the quasi-general agricultural extension approach of State Ministries (Torimiro and Okorie, 2008). However, with the entrance of the World Bank sponsored Training and Visit (T&V) system into the agricultural landscape of Nigeria – all the Statewide ADPs adopted the Training and Visit (T&V) system (Akinbode, 1993). Presently, Training and Visit (T&V) system is the main extension approach in Nigeria (Ajala, 1999). This is a professional system of agricultural extension based on frequently updated training of extension workers and regular field visits (Oladosu, 2015).

Agriculture remains the key component of Nigerian's economy. Currently, it contributes about 40.0% of the Gross Domestic Product (GDP) and employing about 70.0% of the active population (Isa, Badaru, Garba and Bidoli, 2015). However, the sector has significantly underperformed its potential [Federal Government of Nigeria (FGN), 2008]. This has been clearly manifested in the very high food prices nationwide, food insecurity both at the household and national levels and malnutrition amongst women and children (Isa, Badaru, Garba and Bidoli, 2015). It is unfortunate that Nigerian's awesome National Agricultural Extension Research and Liaison Services (NAERLS), the largest in the Sub-Saharan Africa, has not been able to engineer a sustainable agricultural development that would have ensured both National and household food security, improved rural livelihoods and indeed, make Nigeria's agriculture competitive in its world market (Adewale, 2002). Therefore, sustainability of agricultural development depends on the quality and effectiveness of extension services among other factors. Daneji, Vosanka and Undiandeye (2010) observed that in developing countries, there is a gap between agricultural performance and available research information. Vanderlin (2012) supported that the issue has been attributed to poor agricultural extension services delivery and limited interaction between researchers and Extension Agents. These agents are known to be the link between researchers and farmers (Johnson, 2003).

The following objectives guided the study:
1. To study the socio-economic characteristic of some cereal crop farmers in Zangon-Kataf Local Government Area (LGA),
2. To find out the awareness and adoption of some cereal crop technologies in the study area,
3. To determining impact on improvement in living standards due to participation in Training and Visit (T&V) activities in the area,
4. To ascertain yield of cereal crops by subsistent famers and T&V system of agricultural extension services on farmers' adoption of cereals production technologies in Zangon-Kataf Local Government Area (LGA).

Also, it presented two (2) hypotheses, thus:
H_o1: There is no significant relationship between impact of Training and Visit (T&V) system of agricultural extension services and farmers' adoption of cereal production technologies in Zangon-Kataf LGA;
H_a2: There is significant relationship between impact of Training and Visit (T&V) system of agricultural extension services and farmers' adoption of cereal production technologies in Zangon-Kataf LGA.

2. Methodology

2.1 The study area

The study was carried out in Zangon-Kataf Local Government Area (LGA) of Kaduna state. Geographically, it is located between $9^0 25^/$ N and $10^0 20^/$ N and longitude $7^0 45^/$ E and $8^0 40^/$ E is bounded by Kaura LGA in the North, Jama'a in the South, Kachia in the West and Kauru LGA in the East.
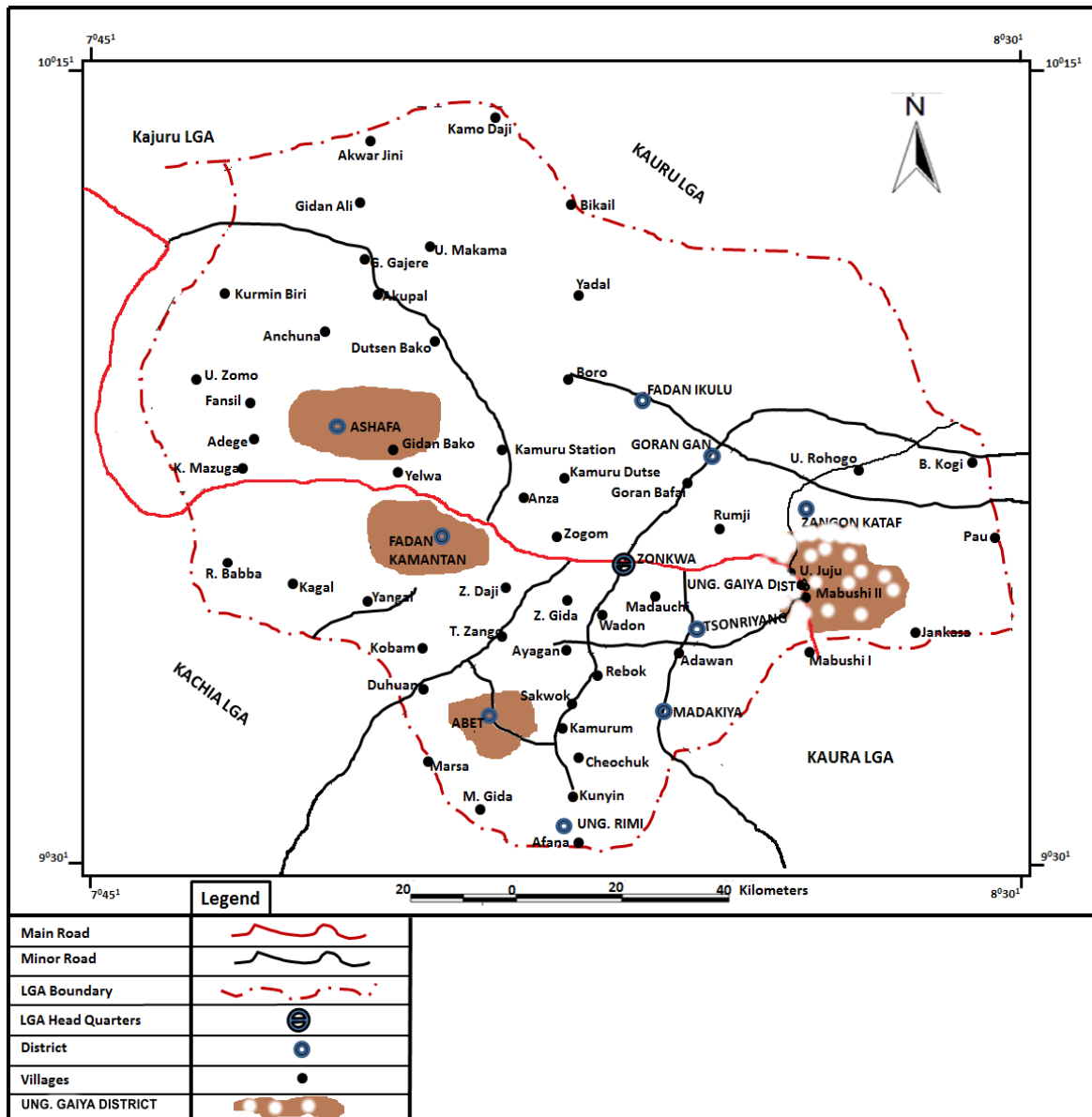

Figure 1: The Map Showing Zangon-Kataf LGA.

The Local Government has an area of 5,625 Square Kilometers (The Information Division of Zangon-Kataf Secretariat, 1999). The population size is 316,370 persons [National Population Commission (NPC), 2007].

2.2 Research Design

A case study research design (descriptive) was adopted for collecting and collating the data. Fifty (50) farmers each from eight (8) villages such as Mayayit, Tagama, Kamantan, Lenak, Kurmin-Bi, Sanzuan, Chirani and Kamuru were randomly selected across all levels of economic advantages such as large, medium or small-scale farming families and administered with the questionnaires. For the fact that major decisions concerning farm operations are taken by heads of each family in Zangon-Kataf LGA, units of household heads were considered during the analysis of data.

2.3 Instrumentation

A structured questionnaire administered to the village extension workers and cereal crop farmers in Zangon-Kataf LGA was developed for the purpose of collecting the data. The questionnaire had a scale ranged of 1, 2, 3 and 4 for not efficient (NE), moderately efficient (ME), efficient (E) and highly efficient (HE), respectively.

2.4 Administration of the instrument

The test instrument was administered to the respondents by the researchers. It involves ticking the options among the choices given. Hence, a total of two hundred (200) copies were distributed and retrieved. In addition, respondents were encouraged not to look at each others' questionnaires while answering the questions. For those who could not understand or speak English language, the questionnaire was translated with the help of interpreters to their dialects and administered as interviews.

2.5 Sampling techniques

Purposive and random techniques were used in the study. Out of the fifty two (52) districts in Zangon-Kataf LGA, one was purposively chosen from the four Chiefdoms, namely: Ungwar Gaiya, Kamanton, Zonkwa and Kamuru districts from Atyap (16), Anghan (8), Bajju (18) and Ikulu (10), respectively]. In addition, twenty five (25) cereal crop farmers were then randomly sampled from two villages within the four districts.

3. DATA COLLECTION & STATISTICAL ANALYSIS

In the study, data were collected from primary and secondary sources with the help of questionnaires administered to the village extension workers and cereal crop farmers in Zangon-Kataf LGA.

The primary data collected from the farmers were based on their characteristics such as age, level of education, family size, extension workers' contact, agricultural credit facilities, farm size, hired labour, farm income, awareness, non-farm income and adoption of recommended practices. While, the secondary data on the structure, operation and management of the Training and Visit (T&V) extension system in Zangon-Kataf LGA were also collected from staff of the Kaduna State Agricultural Development Project (KADP) Samaru-Kataf Zonal office, Ministry of Agriculture and Natural Resources Kaduna, Institute for Agricultural Research (IAR) and National Agricultural Extension and Research Liaison Services (NAERLS) in Zaria.

3.1 Operational indices and variables

Awareness Score $= \dfrac{\text{Total number of innovation being aware}}{\text{Total No of innovation under study}} \times \dfrac{100}{1}$

Adoption $= \dfrac{\text{Total number of innovation currently using}}{\text{Total No of innovation under study}} \times \dfrac{100}{1}$

3.2 Statistical analysis

The data collected for the study was subjected to descriptive analysis. The descriptive statistics such as measure of central tendency, percentages, use of tables was employed to report the impact of Training and Visit (T&V) extension system on farmers' awareness, adoption of agricultural innovations and gross output. While, the Analysis of Variance (ANOVA) test of significant was also used to determine the significant impact on farmers' used of technologies for sustainable development in the study area.

4. RESULT AND DISCUSSION

Table 1: Socio-economic characteristics of some cereal crop farmers in Zangon-Kataf LGA

Item	Variation	Frequency	Percentage
Sex	Male	147	73.5
	Female	053	26.5
	Sub-total	*200*	*100.0*
Age (Year)	20 – 29	018	9.0
	30 – 39	026	13.0
	40 – 49	081	40.5
	50 – 59	052	26.0
	60 and above	023	11.5
	Sub-total	*200*	*100.0*
Marital status	Married	028	14.0
	Single	127	63.5
	Widow(er)	045	22.5
	Sub-total	*200*	*100.0*
Family size	1 – 4 (Small)	068	34.0
	5 – 9 (Medium)	121	60.5
	10 and above (Large)	011	5.5
	Sub-total	*200*	*100.0*
Level of Education	No Formal Education	019	9.5
	Primary	047	23.5
	Adult Education	052	26.0
	Secondary	023	11.5
	Post Secondary	059	29.5
	Sub-total	*200*	*100.0*

Source: Field Survey (2015).

Table 1 revealed males were more prominent in farming activities (73.5%) than females (26.5%). This implied that women found it difficult to acquire farmlands through inheritance and probably resorted to trading than farming cereal crops like maize, rice and sorghum. So the male dominance was probably due to their accessed to farmlands and the positions occupied as heads of families. Similarly, the result obtained was compared in line with that of Oguntola (2009) that, farming is a male-dominated profession.

From table 1, the distribution of farmers by age revealed that 9.0% and 40.5% of them were between 20 – 29 and 40 – 49 years, respectively. The lowest proportion (9.0%) may be due to the fact that, young people prefer white collar-jobs were attracted to urban areas in search of job opportunities. While, the highest percentage (40.5%) was probably considered as the category of old people that serves as custodians of tradition. In the same vein, Ekong (2008) supported the assertion that the population of old people is the most predominant in farming communities in Nigeria.

Table 2: Percentages of responses to the awareness and adoption of some cereal crop technologies in Zangon-Kataf LGA

The cereal crops involved	Technologies	Aware		Not Aware		Adopted		Not Adopted		Still Using		Total	
		Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
1. Maize	Quality protein maize (QPM)	0064	032.0	0027	013.5	0055	027.5	0009	004.5	0045	022.5	0200	
	TZB-SR	0091	045.5	0018	009.0	0054	027.0	0005	002.5	0032	016.0	0200	
	DT-SR-WCZ	0033	016.5	0109	054.5	0033	016.5	0017	008.5	0008	004.0	0200	
	TZESR (open pollinated)	0059	029.5	0008	004.0	0106	053.0	0003	001.5	0024	012.0	0200	
	Spacing in planting	0018	009.0	0157	078.5	0014	007.0	0004	002.0	0007	003.5	0200	
	Seed rate of 1 seed/hole	0062	031.0	0050	025.0	0038	019.0	0024	012.0	0026	013.0	0200	
	Chemical weeding, pest & disease control	0070	035.0	0024	012.0	0059	029.5	0012	006.0	0035	017.5	0200	
	Chemical storage	0056	028.0	0071	035.5	0043	021.5	0014	007.0	0016	008.0	0200	
	Use of chemical fertilizer	0067	033.5	0005	002.5	0069	034.5	0007	003.5	0052	026.0	0200	
	Sub-total	*0520*	*028.9*	*0469*	*026.1*	*0471*	*026.2*	*0095*	*005.2*	*0245*	*013.6*	*1800*	*37.5*
2. Rice	NARICA I,II,III or IV	0068	034.0	0015	007.5	0067	033.5	0007	003.5	0043	021.5	0200	
	FARO	0069	034.5	0035	017.5	0064	032.0	0008	004.0	0024	012.0	0200	
	IITA	0066	033.0	0048	024.0	0038	019.0	0019	009.5	0029	014.5	0200	
	Spacing	0073	036.5	0051	025.5	0030	015.0	0035	017.5	0011	005.5	0200	
	Seed rate	0070	035.0	0038	019.0	0030	015.0	0042	021.0	0020	010.0	0200	
	Chemical weed control	0071	035.5	0015	007.5	0050	025.0	0021	010.5	0043	021.5	0200	
	Threshing	0076	038.0	0007	003.5	0062	031.0	0021	010.5	0034	017.0	0200	
	Use of chemical fertilizer	0059	029.5	0009	004.4	0057	028.5	0008	004.0	0067	033.6	0200	
	Sub-total	*0552*	*034.5*	*0218*	*013.6*	*0398*	*024.9*	*0161*	*010.1*	*0271*	*016.9*	*1600*	*33.3*
3. Sorghum	Samsborg-17 (SK5912)	0052	026.0	0078	039.0	0035	017.5	0017	008.5	0018	009.0	0200	
	LS 187	0040	020.0	0035	017.5	0055	027.5	0025	012.5	0045	022.5	0200	
	Samsorg-14 (KSV8)	0078	039.0	0029	014.5	0036	018.0	0043	021.5	0014	007.0	0200	
	Spacing	0046	023.0	0082	041.0	0027	013.5	0018	009.0	0027	013.5	0200	
	Seed dressing	0056	028.0	0033	016.5	0039	019.5	0028	014.0	0044	022.0	0200	
	Seed rate	0032	016.0	0094	047.0	0042	021.0	0011	005.5	0021	010.5	0200	
	Use of chemical fertilizer	0099	049.5	0007	003.5	0070	035.0	0005	002.5	0019	009.5	0200	
	Sub-total	*0403*	*028.8*	*0358*	*025.6*	*0304*	*021.7*	*0147*	*010.5*	*0188*	*013.4*	*1400*	*29.2*
	Total	**1475**	**030.7**	**1045**	**021.8**	**1173**	**024.4**	**0403**	**008.4**	**0704**	**014.7**	**4800**	**100.0**

Source: Field Survey (2015).

Table 2 indicated that with the impact of Training and Visit (T&V) system of agricultural extension services on farmers' adoption of cereals production technologies for sustainable development, cereal crop farmers were aware (30.7%) and adopted (24.4%) the technologies they felt would sustain their means of livelihoods. The data coincided with the study of Ndaghu (2010) that farming families do engaged in strategies they felt would meet their felt-needs.

Table 3: Percentages of responses to the yield of cereal crops by subsistent famers in Zangon-Kataf LGA

	Yield of the cereal crops (1 – 500 Kg):							
Technologies	Maize		Rice		Sorghum		Total	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Improved varieties	093	46.5	083	41.5	024	12.0	200	100.0
Spacing in planting	078	39.0	054	27.0	068	34.0	200	100.0
Seed rate	067	33.5	104	*52.0*	029	14.5	200	100.0
Use of Chemicals	097	48.5	065	32.5	038	19.0	200	100.0
Total	**335**	**41.9**	**304**	**38.0**	**159**	**19.9**	**800**	**100.0**

Source: Field Survey (2015).

In table 3, the farmers had 41.9%, 38.0% and 19.9% for maize, rice and sorghum, respectively. When the responses were subjected to a scale of ratio one is to four (1:4), the result portrayed that maize and rice farmers with 41.9% and 38.0% were rated efficient – while sorghum with 19.9% was not efficient. Farmers were further asked to rate their reasons for the preference of cereal crops mentioned. The maximum percentage was obtained in favour of 'high yielding crop per hectare of land cultivated' scored 53.0%, while the minimum for 'low in fertilizer requirement' 15.0%. The result is in agreement with the work of Ekpere (2011) who concluded that new technologies are meant to improve the gross output of farmers, if effectively utilized for sustainable development.

Table 4: Impact on the improvement in living standards due to participation in Training and Visit (T&V) activities

Variables	Goods	Frequency (Freq.)	Percentage (%)
1. Durable	a. Tractor	001	0.5
	b. Bicycle	016	8.0
	c. Motorcycle	034	17.0
	d. Grinding/milling machine	024	12.0
	e. Other related goods	035	17.5
2. Luxury	a. Family bed	015	7.5
	b. Carpet (Rug/Leather)	004	2.0
	c. Radio, Television, Video and other related electronics	066	33.0
	d. Marriage	003	1.5
	e. Other related issues	002	1.0
	Total	**200**	**100.0**

Source: Field Survey (2015).

Table 4 showed the improvement in living standards of farmers due to their participation in Training and Visit (T&V) activities in Zangon-Kataf LGA. The adoption of Training and Visit (T&V) system of agricultural extension services of KADP has really impacted on the living standards of farmers in the area. The result revealed that most the farmers acquired luxury goods like Radio, Television, Video and other related electronics (33.0%). Durable assets like Tractors had the lowest percentage of 0.5. This may be attributed to the high cost of its procurement. As such, heavy duty machineries are beyond the reach of most subsistent farmers. If these machineries are not subsidized, it may be difficult to integrate agricultural technology for sustainable development in Nigeria.

Table 5: Analysis of Variance (ANOVA) of Training and Visit (T&V) system of agricultural extension services on farmers' adoption of cereals production technologies

Sources of Variation	Degree of Freedom	Sum of Squares	Mean of Squares	$F_{cal.}$	$F_{tab.}$	Decision
Between Treatments	3	34456.18	11485.58	5.36	3.03	Significant
Within Error	23	49324.34	2144.54			
Total	26	83780.52				

If $F_{cal.} \geq F_{tab}$, Reject H_0 at Level of Significance (α) of ≤ 0.05.

In table 5, the hypothesis tested reveals a significant relationship as $F_{cal.}$ (5.36) was greater than $F_{tab.}$ (3.03). The test meant that there is statistically significant relationship between impact of Training and Visit (T&V) system of agricultural extension services and farmers' adoption of cereal production technologies in the study area.

5. CONCLUSION

The study determined the impact of training and visit system of agricultural extension on farmers' adoption of cereals production technologies for sustainable development in Zangon-Kataf LGA. The result indicated that the distribution of farmers by age revealed that 9.0% and 40.5% of them were between 20 – 29 and 40 – 49 years, respectively. The lowest proportion (9.0%) may be due to the fact that, young people prefer white collar-jobs were attracted to urban areas in search of job opportunities. While, the highest percentage (40.5%) was probably considered as the category of old people that serves as custodians of tradition in Zangon-Kataf Local Government Area (LGA).

Nevertheless, the researchers concluded that cereal crop farmers in the area were aware (30.7%) and adopted (24.4%) the technologies they felt would sustain their means of livelihoods. In the same vein, there was improvement in living standards of farmers because of their participation in Training and Visit (T&V) activities in the study area. This manifested in farmers acquiring luxury goods like Radio, Television, Video and other related electronics (33.0%) as well as a durable asset like Tractor (0.5%).

6. RECOMMENDATIONS

Base on these findings, the following recommendations were made for institutional consideration:

8. Adequate farm inputs and equipments be supplied at highly subsidized rates to encouraged agriculture production;
9. Adequate funds be release to provide effective span of control and the unity of command in Training and Visit (T&V) system of agricultural extension services;
10. Adequate means of transportation be provided to enable extension agents visit their contact farmers at the appointed time;
11. Formation of viable agricultural co-operatives be encouraged to increase the bargaining power of farming families;
12. Professional extension agents be encouraged to draw specific policy statements that would provide sustainable development for Nigerian farmers;
13. The participatory approach of Training and Visit (T&V) system be sustain through linking agricultural extension and research for appropriate cereal crop technologies.

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