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Impact of Bauchi State Agricultural Development Programme (BSADP) on the Livelihood of Maize Farmers in Western Agricultural Zone of Bauchi State, Nigeria: 2009 - 2015

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ABSTRACT

The study was conducted to study the impact of Bauchi State Agricultural Development Programme (BSADP) on the livelihood of Maize Farmers in Western Agricultural Zone of Bauchi State, Nigeria: 2009 – 2015.The objectives of the study were to: describe the socio-economic characteristics of respondents, determine type of technology received/adopted by respondents and examine the impact(s) of maize technology adopted by the respondents over the years. A multi-stage sampling technique was used to collect primary data with the aid of a structured questionnaire. Results obtained showed that 63.9% of respondents in the study area are in their prime stage of production and majority (79.1%) of the respondents had one form of western education. It also revealed that 65.8% of the respondents receive their major extension services from BSADP. Impact was made on farmers at various significant levels of 0.05, 0.01 and 0.000. Highest impacts were on house type, means of transport type, communication means type, herbicide use and ownership of knapsack at a significant level of P<0.001. The study concluded that BSADP had made Impact in the livelihood of maize farmers in western agricultural zone of Bauchi State. Extension providers should encourage farmers to keep records since most of them can read and write, this will not only help the farmers but extension system as a whole. BSADP through its EAs; should uphold its good work in the study area and build cordial relationship with the farmers. Government and donor agencies should keep on supporting Bauchi State Agricultural Development Programme (BSADP).

1.0 INTRODUCTION:

According to Olusegun *et al.,* (2014), agriculture still offers the leading source of livelihood, and contributes a great percentage to national income for most developing countries around the world. The rural area is the predominant food and fibre producing sector of the Nigerian society and all natural resources which constitute the wealth of a nation are obtained from the rural areas. The importance of the rural areas in Nigeria also lies in the mere fact that over 70% of the people live and derive their livelihood from there. The state of the rural areas in Nigeria is determined by a combination of methods which include available social, physical and institutional infrastructures as well as the people's level of living including their levels of perceived deprivation and satisfaction with current level of living. The rural areas in Nigeria is characterized by lack of public infrastructure, sub-standard education, poor health services and low agricultural productivity leading to poor standard of living for the majority (Lawal *et al* 2009). Agricultural extension service played a significant role in improving production in Nigeria through adequate access to information, advisory services and demonstration on improved techniques of production to farmers .Various extension – teaching methods have been employed to make sure that the technologies get to the end – users. Prominent among these is the Training and Visit system of the Agricultural Development Programme. The central principle or idea of the extension strategy is to produce competent and well-informed` Extension Agents who will frequently and regularly visit farmers with relevant technical messages and bring farmers problems to research. The system of extension entails that each extension agent is required to regularly visit the farmers/farmers' group with relevant messages that are specific to the farm practices taking place in the field at that point in time. Feedback is also taken by the extension agents from farmers to the Research stations. The extension service operates from the back drop belief that increased agricultural productivity depends primarily upon acceptance of improved cultural and technological change at the rural farm level and that peasant farmers can achieve improved production only if they adopt recommended agricultural practices in place of traditional ones. Successful adoption of improved agricultural practices is predicated upon rural farmers acquiring the required knowledge and understanding of these technologies. This will improve productivity and raise the living standards of the farmers who are the beneficiaries of the service (Benor and Harrison, 1983; in Lawal *et al* 2009).There are many challenges for the agricultural sector, such as the need to strike a balance between increased productivity to feed a growing global population and reducing negative environmental externalities including climate change. Extension services are important in these circumstances as they can act as levers to change existing behaviour in the wider agricultural and rural sectors. However, coupled with this responsibility is a financial challenge as global economies navigate the recent turbulent macroeconomic cycles and there is a renewed emphasis on 'value for money' policies. Thus, an evaluation of the impact of existing services is useful to ensure targeted efficient extension programmes are delivered into the future, thus, providing assistance in achieving targets set out in policies such as Food Wise 2025 in Ireland (Cawley *et al*, 2015). Ragasa *et al*, (2016) also reported that Governments and donors have initiated many programs to improve the agricultural productivity and food security of many poor SSA countries, but there are mixed results on their effectiveness. It is against these background that the study aim at investigating Impact of Bauchi State Agricultural Development Programme (BSADP) on The Livelihood of Maize Farmers in Western Agricultural Zone of Bauchi State, Nigeria: 2009 – 2015 and the specific objectives are to:

i. describe the socio-economic characteristics of the respondents
ii. determine the types of technologies received from extension organizations
iii. examine the types of technologies adopted/ level of adoption among respondents
iv. examine the impact(s) of maize technologies adopted by the respondents over the years.

2.0 METHODOLOGY:

The study was carried out in Bauchi State, Nigeria. The State is located in the northeastern part of Nigeria; 10.7761N and 9.9992 E. It covers a total of 49, 259,01km^2 of land mass with 20 Local Government Areas. The vegetation of the state ranges from Sudan savanna from the south to Sahel savanna with annual mean rainfall of 1,091.4 mm (BASG, 2020).

A multi-stage random sampling technique was used to select farmers for the study. Five sub zonal offices (Alkaleri, Bauchi, Dass, Kirfi and Toro) were purposely selected based on interest on maize farmers. Two blocks were then randomly selected per sub-zone and two cells in each block were randomly selected too. Also, four respondents were randomly selected from each sub-cell: given rise to 8 respondents per cell, 16 per block, 32 per sub- zone and finally a total of 160 respondents. These maize farmers were sampled through the assistance of selected contact farmers; but 157 questionnaires were retrieved and analyzed. Descriptive statistics was used to analyze objectives 1, 2 and 3 while inferential statistics was used to analyze objective number 4: paired 'T' test.

$$t = \frac{\sum d}{\sqrt{\frac{n(\sum d^2) - (\sum d)^2}{n-1}}}$$

Table 1: Sample size of maize farmers participants in survey

Sub-Zones	Blocks	Cells	Sub-Cells	Sample Size
Alkaleri	2	2Cells/Block=4	2SubCell/Cell=8	4farmers/Sub-Cell =32
Bauchi	2	2Cells/Block=4	2SubCell/Cell=8	4farmers/Sub-Cell =32
Dass	2	2Cells/Block=4	2SubCell/Cell=8	4farmers/Sub-Cell =32
Kirfi	2	2Cells/Block=4	2SubCell/Cell=8	4farmers/Sub-Cell =32
Toro	2	2Cells/Block=4	2SubCell/Cell=8	4farmers/Sub-Cell =32
TOTAL	**10**	**20**	**32**	**160**

Source: Field survey, 2016

3.0 RESULTS AND DISCUSSION:

3.1 Socio-Economic Characteristics of Respondents

Table 1 revealed the socio-economic characteristics of the respondents; Respondents' age showed that majority (63.9%) of the farmers in the study area were between 31-50years while 14.8% were below 31years and only 7.7% were above 60 years. The implication of this result is that majority of the farmers are in their active age and can contribute immensely to food production to ensure food security in the study area, the state and the nation at large. This corroborates the findings of Yohanna *et al.*, (2014).Who reported 41years as the mean age of farmers. So: most of the arable crop farmers were in their prime age and are still active farmers that are capable of seeking information on farming. Majority (72.0%) of the respondents were males. This implies that men in the study area were more involved in maize production than the women. In accordance with the prevailing culture, men are to cater for the households needs and may be assisted by other members of the household. This result is in line with the findings of Babalola and Olayemi (2013), who in their study on Determinants of farmers' preference for sustainable land management, in Ogun State, Nigeria; reported that most (92.0%) farmers are males, which may be attributed to religious and cultural factors. However women should be encouraged by extension agents to participate in agricultural production by the help of a trusted member within the family; where she cannot manage the activities herself. Women are also known to effectively handle some aspect of farming activities along the agricultural value chain. They can therefore be engage in areas like local processing of agricultural produce where they have comparative advantage over men.

Majority (82.2%) of respondents are married, followed by 11.5% who are single, then 5.1% that are widow and 1.3% who are divorcees. The high percentage of married individuals may be attributed to regional factors where religion, norms and culture encourage marriage among citizens. This result is in agreement with the findings of Babalola and Olayemi (2013), who in their study on Determinants of Farmers' Preference for Sustainable Land Management, in Ogun State, Nigeria. He reported that most (93.8%) of the farmers in the study area are married. Similarly, Ofuaku (2011) found that, married farmers had responsibilities that most be reflected on their farming activities. If marriage is a sign of responsibility, this shows that most of the farmers in this study area are responsible people who are committed to struggle so as to take care of family responsibilities, and this make them increase their level of production.

The results also revealed that 28.80% of maize farmers had attended one form of tertiary education or the other. Next is secondary education with 29.7%, followed by primary education which constituded19.4% and then Qoranic education constituted 16.8%. The high percentage of maize farmers with tertiary education is peculiar to western zone that has high percentage of educated farmers as reported by BSADP in 2006. This finding corroborates Yohanna *et al.*, (2014) who reported that, most farmers had one form of education or another and the preponderance of such educated farmers in the study can influence their information seeking behavior which should be used to boost agricultural production. Findings of this study revealed that 44.8% of the maize farmers have arable crop farming as their primary occupation, civil servant constituted 15.1%, followed by vegetable crop farming which constitute 14.5%, then agro-processing was 7.9%, commodity marketing 5.3%, tree crop, livestock constituted 3.3% each, poultry farming 5.3% and fish farming which is the least with 0.7%. Arable crop farming been the primary occupation of most farmers in the study is in consistence with Mark (2011), who reported that over 70% of Nigerian populations are rural dwellers where farming activities is the major occupation.

3.2. Major Source of Information from the Various Extension Agencies

Major sources of extension service here refer to the major place, person or organization from which the

farmer gets his extension service. Results from Table 2 shows that majority (65.8%) of the maize farmers in the study area received their major extension service from BSADP, 8.6% received from their Local Government extension agencies, 7.9% received from NGOs. The least was 1.3% who received their major extension service from private organizations. Which agrees with Issa and Kagbu (2017) in their studies of institutional Factors Influencing Crop Farmers Adoption of Recommended Agrochemical Practices in Nigeria; who finds that majority (93.1%) of farmers gets their information on new technology from Agricutural Development Programme (ADP). Yohanna *et al*, (2014) in his study on the Sources of Information on Climate Change among Arable Crop Farmers, In Adamawa State, Nigeria also reported that close to half of the respondents (42.28%) did not get information from extension agents. The contrast may be due to the general studies on topic done by most researchers and the specific focus on extension agencies in this research. Other sources of information are considered good; depending only on the nature and aim of information. Results from Table 2 shows that majority of the maize farmers who constitutes 53.6% consider radio as the most appropriate, affordable and convenient means of communication; followed by 32.7%, who preferred EAs. The least is 1.3% who considers other means of communication as most appropriate. This concurred with Arbuckler Jr. (2017) in his study of Communication Preferred by Iowa Farmers, Iowa, USA; fine out that farmers still prefer traditional forms (extension visit, meetings, workshops, field trips and radio) of communication than the new media forms (inter-net, face book, whatsApp, etc) . Generally the farmers prefer radio as most appropriate means of communication in this part of the world, but extension scientist/experts do consider the nature of massage (simple or complex) and the ultimate aim (just to create awareness or adopt a technology). Other means of communication are good but extension agent is the best considering it as an individual and or group method that is done by physical contact, which cannot be easily replaced; thus a need for attention and more studies by researchers. Family, friends, neighbors, farmers' association etc cannot replace extension agents, as their massage/source may be questionable and may be distorted as it pass from one person to another; except otherwise been trained.

3.3. Types of Technologies Received from Extension Organizations

Table 5 revealed that majority of maize farmers which constituted 79.0% had at least, a maize demonstration farm in there locality within the 7 years under study, while 21% had not. Majority of them had seen a maize demonstration farm, this is consistent with BSADP report of 1999-2006 where it reported that 75% of demonstration farm that was intended were conducted. It also shows types of technologies received by respondents to include: land preparation, plant spacing, planting dept, plant protection, harvesting and storage among others; with the response of saying yes, as: 82.6%, 89.7%, 75.8%, 87.2%, 69.7%, and 85.6% respectively. These agrees with BSADP annual reports of 2009 to 2012 on extension activities and types of packages been disseminated independently or in collaboration with such organizations like SG2000, IITA, etc.

3.4. Types of Technologies Adopted/ Level of Adoption among Respondents

Table 6 reveals that technologies on land preparation, plant spacing and planting dept's were adopted by 85.8%, 78.7% and 64.5% of respondents respectively: land preparation has the highest level of adoption with 85.8%; followed by plant spacing 78.7% and then planting dept 64.5%. Technologies on land preparation were highly adopted; while plant protection, harvesting and storage were poorly adopted by 30.3%, 19.2% and 27.5% respectively. Adoption level was lowest in harvesting techniques. The result is in contrast with Ugwumba and Okechukwu (2015) in their study of Adoption of Improved Maize Production Technologies in Enugu State, Nigeria; that shows a general low adoption level of the technologies except for the seed; but agrees with Anyanwu 2018 in her study of: Constraints to Adoption and Utilization of Cassava Production Technologies among Farmers in Imo State, Nigeria; who shows that land preparation was one of the techniques that were adopted by farmers. The adoption may be attributed to increase in yield, low cost of production or reduction in drudgery. Land preparation is paramount in maize production in terms of moisture control (water logging or dryness of farm lands) and so farmers will gladly adopt the technology each as his case may be; as the effect on yield is obvious. Plant spacing (inter and intra row) determine plant population and ultimately yield this may be the reason for high adoption. The low adoption rate seen in storage and harvesting techniques may be attributed to the needs of the farmers as traditional methods are satisfactory and relatively cheaper compared to modern ones.

3.5. Impacts of Maize Technologies Adopted By Respondents over the Years.

Table 5 reveals an impact in residence ownership where 35% of respondents had either build or purchase a house after 2009 as against 18.5% before 2009; there was also improvement in farm machinery ownership where 26.1% of respondents had acquired maize crusher after 2009 as against 16.9% before 2009. Herbicide use witness positive impact as well 82% of the farmers now using herbicides as against 67.3% of the former. These are in agreement with Ragasa *et al*., (2016) in their studies of the Impact of Agricultural Extension Services in the Context of a Heavily Subsidized Input System shows that 79% of farmers

attested to have seen impact as against 21% who did not; Lawal *et al*., (2009) in their studies – Impact of Agricultural Extension Practices on the Nigerian Poultry Farmers Standard of Living show a 50% increase in egg production compared to initial 20%, and 58.3% of poultry farmers' had improvement in their housing conditions. Cowley *et al*., (2015) in their studies The Impact of Extension on Farm Level Outcome; report a 19% increase as well.

3.6. Impact Analysis of BSADP on the Livelihood of Respondents Using 'T' test

'T' test was used to measure the impact of BSADP on some variables as they affect the respondents. Table 6 shows that there was impact on the residence ownership of respondents at P< 0.05 level of significant, 2- tail test. The tested result of 0.025 shows a moderate significant which confirmed the impact seen in the descriptive statistics analysis. It also shows an impact on housing type at P<0.001 significant level. The tested result of 0.000 shows a very high significance there by confirming the descriptive statistic analysis. The result further reveals that impact was made on the transport means of respondents at P< 0.001 significant level; tested statistic of 0.000 means that the degree of significance is very high. It is similar it is similar to communication means in same Table 6 which also tested 0.000 with a very high degree of significance on the communication means of maize farmers at P<0.001 significant level. There was low significant impact on the ownership of farm machinery among farmers with 0.041 tested statistics at P<0.05 significant level of two tail test. This may be due to alternatives such as human labour which is abundant and relatively cheap compared to maintenance of machines. Tested statistics on water sources was 0.002 at P<0.01 significant level; this means there was high impact on water source. Herbicide use and knapsack ownership had shown to be birds of the same feathers that flies to the same direction with very high impact of 0.000 at P<0.001. This may be as a result of the need of timely operation in maize. Ownership of work bulls shows high impact of 0.003 when tested at P<0.01.

5.0. CONCLUSION AND RECOMMENDATIONS

Most of the maize farmers in the study area were male who were in their prime age of production and married. Majority of them has formal education with farming as their primary occupation. Respondents' major source of information on maize technology among various extension delivery agencies in the study area is BSADP. BSADP had made Impact in the livelihood of maize farmers in western agricultural zone of Bauchi State: highest impacts were on house type, means of transport type, communication means type, herbicide use and ownership of knapsack at a significant level of P<0.001. It is recommended that, all encompassing agricultural packages that will include all members of the family be considered in design of packages by consultants. Extension providers should encourage farmers to keep records since most of them can read and write, this will not only help the farmers but extension system as a whole. BSADP through its EAs; should uphold its good work in the study area and build cordial relationship with the farmers. Government and other donor agencies should keep on supporting Bauchi State Agricultural Development Programme (BSADP).

Table 1: Socio-economic characteristics of respondents

Variable	Frequency	Percentage
Age range		
Below 21	11	7.1
21-30	12	7.7
31-40	51	32.9
41-50	48	31.0
51-60	21	13.5
Above 60.	12	7.7
Total	155	100
Sex		
Male	113	72.0
Female	44	28.0
Total	157	100
Marital status		
Married	129	82.2
Single	18	11.5
Widow	8	5.1
Divorce	2	1.3
Total	157	100
Education level		
Primary	30	19.4
Secondary	46	29.7
Tertiary	23	14.8
Quranic	26	16.8
None	30	5.4
Total	155	100
Occupation		
Civil servant	23	15.1
Arable crop farming	68	44.8
Vegetable crop farming	22	14.5
Tree crop farming	5	3.3
Live stock farming	5	3.3
Fish farming	1	0.7
Poultry farming	8	5.3
Commodity marketing	8	5.3
Agro processing	12	7.9
Total	152	100

Source: Field survey, 2016

Table 2: Major source of information from the various extension agencies

Variables	Frequency	Percentage
Major sources of extension service		
University	9	5.9
Research institute	8	5.3
NGOs	12	7.9
Private organizations	2	1.3
Donor agencies	5	3.3
Local Government agencies	13	8.6
Federal Government agencies	3	2.0
BSADP	100	65.8
Total	152	100

Source: Field survey, 2016

Table 3: Distribution of respondents according to types of technologies received.

Variables	Frequency	Percentage
Presence of demonstration farm		
Yes	124	79.0
No	33	21.0
Total	156	100
Types of technology received		
Land preparation		
Yes	130	82.6
No	27	17.4
Total	157	100
Plant spacing		
Yes	141	89.7
No	16	10.3
Total	157	100
Planting dept		
Yes	121	75.8
No	36	22.7
Total	157	100
Plant protection		
Yes	137	87.2
No	20	12.8
Total	157	100
Harvesting		
Yes	110	69.7
No	47	30.3
Total	157	100
Storage		
Yes	134	85.2
No	23	14.8
Total	157	100

Source: Field survey, 2016

Table 4. Percentage distribution of respondents by technology adopted/level of adoption (n=157)

Technology	Percentage
Land preparation	85.8
Plant spacing	78.7
Planting dept	64.5
Plant protection	30.3
Harvesting	19.2
Storage	27.5

Source: Field survey, 2016

Table 5a: Distribution of respondents according to living condition before and after 2009

Variables	Before 2009		After 2009	
	Frequency	Percentage	Frequency	Percentage
Residence ownership				
Purchase/ build	29	18.5	55	35.0
Inherited	79	50.3	63	40.1
Rented	20	12.7	12	7.6
Family	25	15.9	19	12.1
Others	4	2.5	8	5.1
Total	157	100	157	100
House type				
Mud thatched	21	13.4	6	3.8
Mud zinc	92	58.6	89	56.7
Cement bricks zinc	43	27.6	60	38.2
Others	1	0.6	2	1.3
Total	157	100	157	100
Type of major transport means				
None	20	12.8	13	8.3
Bicycle	34	21.8	19	12.2
Motorcycle	94	59.6	89	59.4
Tricycle	2	1.3	17	10.9
Pick-up	6	3.8	18	11.5
Others	1	0.6	1	0.6
Total	157	100	157	100
Means of communication owned				
Radio only	108	68.9	68	43.1
TV only	1	0.6	3	2.0
TV and Radio	46	29.2	84	53.6
None	2	1.3	2	1.3
Total	157	100	157	100
Water source				
Well	76	47.7	70	44.2
Borehole	55	35.5	44	28.2
River/stream	21	13.5	22	14.2
Tap water	2	3.2	21	13.5
Total	157	100	157	100
Herbicide use				
Yes	106	67.3	128	82.0
No	51	32.7	29	18.0
Total	157	100	157	100

Source: Field survey, 2016

Table 5b: Distribution of respondents according to living condition before and after 2009

Variables	Before 2009		After 2009	
	Frequency	Percentage	Frequency	Percentage
Farm machinery ownership				
Tractor	12	6.8	22	14.1
Planter	18	10.2	13	8.9
Water pump	51	32.2	48	30.4
Maize crusher	29	16.9	42	26.1
Others	56	33.9	32	20.0
Total	157	100	135	100
Work bulls				
None	75	47.1	59	37.8
Two	55	35.5	56	35.8
Four	22	14.2	32	20.9
Six	4	2.6	3	2.0
Eight	1	0.6	2	1.4
Ten	0	0	3	2.0
Total	157	100	157	100

Source: Field survey, 2016

Variables	Mean	'T'	Df	Sig. (2- tail)
Residence ownership	0.19108	2.265	156	0.025*
House type	-0.21656	-4.671	156	0.000***
Transport means	-4.3226	-5.812	154	0.000***
Communication means	-0.50667	-6.074	149	0.000***
Farm machinery ownership	0.24545	2.071	109	0.041*
Major water source	-0.253225	-3.121	153	0.002**
Herbicide use	0.29530	7.209	148	0.000***
Knapsack ownership	0.14094	3.952	148	0.000***
Work bulls ownership	-0.26351	-2.975	147	0.003**

Source: Field survey, 2016
***=** significant at P<0.05, **= significant at P<0.01, ***= significant at P<0.001

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