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Effects of Agricultural Input Voucher Programme on Smallholder Farmer's Livelihood in Taraba State, Nigeria

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Abstract: *The study assessed the effects of Agricultural Input Voucher Programme (AIVP) on the smallholder farmer's livelihood in Taraba State, Nigeria. Primary and secondary data were both used for this study. The primary data involved use of structured questionnaires. Multistage sampling technique was employed to select 350 respondents as sample for the study. Both descriptive statistics, such as frequencies, percentages, mean and inferential statistics and paired sample test were used to analyze the data. The findings of the study revealed that most of the participants (60.40%) were within the age group of 21 to 40 years. Majority (60.80%) were males, most ((39.20%) were literate with secondary education and had mean of 7 members per household and their mean farming experience was 10.5 years. Majority (70.90%) of the participants had access to extension services and 79.70% belonged to an association. The respondents' mean annual farm incomes were ₦153,052 (before) and ₦242,884 (during) AIVP respectively. In addition, the results of programme effect on income indicated that the participants annual farm incomes increased by 90.38% and 6.64% on rice and maize respectively. The paired sample test results also showed significant difference (t = -2.99; p=0.01 rice) between the participants mean farm income before and during AIVP, but was not significant (t= -1.39^{NS}) between the mean incomes obtained from maize. Findings on the effects of AIVP on assets ownership revealed that there were increased ranging from 30% to 150% in the various assets owned by the participants. The study concluded that AIVP positively affected the livelihood of the smallholder farmers in terms of increased income and assets. This study recommended that the programme should be sustained through increased the beneficiary's co-payments.*

Keywords*: Agricultural Input Voucher Programme (AIVP), smallholder, livelihood, Taraba.*

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I. Introduction

Agricultural production like production activities in any other sector, such as mining and manufacturing requires accessibility to quality inputs to be transformed into output that will raise productivity. The access and efficient use of quality agro-inputs, such as improved seeds, fertilizers and Crop Protection Products (CPPs) is necessary to improve agricultural production and increase farmer's livelihood, such as farm output, incomes and assets, particularly in Sub-Saharan Africa (SSA) (International Centre for Soil Fertility and Agricultural Development; IFDC, 2011). The need for inputs use is justified by reasons, such as replenishment of soil nutrients to combat decline in soil nutrients, control of pests, weeds which considerably suppress crop yields and to obtain higher farm yields.

Raising agricultural productivity through timely access and the use of quality agro-inputs is however one of the principal challenges facing Nigeria's agriculture. In order to address inputs challenges, various policy approaches were adopted by the Federal Government of Nigeria (FGN) from 1970s to 1990s. These included: the promotion of a state monopoly of fertilizer import and distribution; the institution of import tariffs; decentralization of procurements and distribution, and deregulation of markets (Ayoola, 2001; Liverpool-Tasie *et al*.,2010).Though some programmes, such as substantial state subsidy ranging from 65% to 83% were beneficial others, like decentralization of procurements and distribution and state monopoly of fertilizer import and distribution were not satisfactory as planned (Dorward, 2009; IFDC, 2013). This made Government Direct Subsidies (GDS) to be expensive and unsuccessful with benefits accruing mainly to larger farmers more than the targeted smallholder farmers (Gregory, 2006). The resultant effect of this was that fertilizer use under government direct approaches has been low, as the average fertilizer use reported in Nigeria is just 13 kg/ha compared to world average of 100 kg/ha (IFDC,2010). Low fertilizer usages are mostly in smallholder food crop and livestock production systems (Food and Agriculture Organization, FAO, 2013; IFDC, undated).

In response to the low fertilizer usage under government direct delivery approach, Nigeria government in collaboration with international organizations, such as FAO and IFDC had during the year 2000s introduced fertilizer subsidies that operated through voucher coupons. Vouchers are like real money and certificates by which smallholder farmers are given the ability to pay for inputs, such as fertilizer and seeds at a registered shop of their choice (Kachule and Chilongo, 2007). This is a new area of interest, which seeks to maximize multiple benefits of subsidies, especially by smallholder farmers and private agro- dealers (Morris *et al*., 2007). The input voucher programme is aimed at enhancing access to improve inputs in order to increase farm productivity, which is the participant's means of improving livelihood.

The concept of livelihood comprises the capabilities, assets and activities required for a means of living (Department for International Development, DFID, 2000). Assets are the core issues in livelihood. It emphasized that people have different kind of assets that they combine to help them achieve the livelihoods that they seek. The accesses to assets the people have affect the strategies employed to achieve desired livelihood outcomes. The voucher programme is fundamental to improving agricultural livelihood activities, especially among smallholder farmers. Its major advantage is to improve targeting of beneficiaries, who have difficulties in accessing inputs that are distributed directly by government agencies to farmers. The main target is the smallholder farmers, with characteristics, such as dependence on small scale agricultural production as means of livelihood; utilizing mainly farm labour, crude implements, use manure and unimproved seeds.

The objective of the input voucher programme is to contribute to higher food production and productivity in targeted areas by improving farmer's access to critical agricultural inputs. The anticipated primary outcomes of the voucher programme are to improve targeting of smallholder farmers, lower unit cost of fertilizer and increase its level of utilization. Similarly, the expected secondary effects include increase in productivity, crop output and farm income and by implication, the farmers livelihood. The experiences with the programme in Kenya, Malawi and Tanzania revealed its effect on livelihood, such as increased crop yield, income and assets, like hoes, chickens and goats (Mangisoni *et al*., 2007; IFDC, 2012; Kato, 2013; Mutambara *et al*., 2013 ; Maina *et al*., 2016).

In Taraba State of Nigeria, smallholder farming is the major livelihood activities of about 75% of the population. Their major challenges are the use of unimproved inputs, like fertilizers and seeds arising from difficulties in accessing government subsidized improved inputs that are directly distributed to farmers due to problems, such as corruption and high cost. Their farm income is low arising from low productivity, crop yield and declining soil fertility. In order to address these challenges the input voucher programme was implemented on a pilot scale from 2009 to 2011 and following the successes recorded in the pilot project, the full programme was implemented in 2012 using e-wallet. As a result nearly 40,000 farmers were able to obtain two bags of discounted fertilizer from the private sector and more than 30,000 farmers have been given access to the programme using their mobile phones (IFDC, 2015). The input voucher programme has been implemented in the State for a considerable length of time now, but its effects on the beneficiary's livelihood remained unanalysed and understood. Therefore, this study was undertaken to assess the effects of Agricultural Input Voucher Programme on the participant's livelihood in Taraba State, Nigeria.

II. Objectives of the Study

The main objective of the study was to assess the effects of Agricultural Input Voucher Programme on the participants' livelihood in Taraba state, Nigeria. The specific objectives were to:

i. examine the socio-economic characteristics of the participants;
ii. determine effect of the programme on farm income of the participants;
iii. analyze the programme effect on the assets of the participants.

III. Methodology of the Study

The study was conducted in Taraba State, Nigeria. The state between latitudes $6^0 30^1$and $9^0\ 36^1$ North and longitudes $9^0 10^1$ and $11^0\ 5^1$ East. It covers a land area of 59,400 square kilometres. Taraba state is bounded on the North by Bauchi and Gombe states, in the North-East by Adamawa state, and Plateau state in the North West. Both Nasarawa and Benue states further bound the state to the west. The state shares an International Boundary with the Republic of Cameroon to the South and South-East (NAERLS, 2011). According to National Population Commission (NPC, 2006), Taraba State has a population figure of 2,300,736 people with an annual growth rate of 2.5%. The projected population in 2016 based on the 2.5% growth rate was estimated at 2,945,137 people.

Multi-stage sampling procedure was employed to select the respondents from the sampling frame of 2802 participants in the four (4) agricultural zones in the State. The first stage was proportionate (56.25%) selection of nine (9) LGAs out of 16 local government areas existing in the State. The second stage was proportionate (52.08%) selection of 50 out of 96 wards in the selected LGAs. Finally, the third stage involved the proportionate (12.49%) selection of 350 respondents from the sampling frame (2802) used which was

determined using the Yamane's approach adopted by Kaplana (2011) and Usman (2014). Out of the 350 questionnaires administered, Six (6) were not retrieved. In all the stages used simple random sampling technique (lottery method) was adopted in selecting the samples. The Yamane's formula is expressed as follows:

$$n = \frac{N}{(1+Ne^2)} \quad \ldots\ldots\ldots (1)$$

Where:
n=Sample size
N=Population size
e=Alpha level (0.05)

Table 1: List of the Sampled LGAs, Wards and the Participants

Agric. Zones/ LGAs	Number of LGAs		Number of Wards		Number of Participants	
	Population	**Sampled**	**Population**	**Sampled**	**Population**	**Sampled**
1. Jalingo, A/Kola, Zing, Lau, K/Lamido and Yorro	6	Jalingo	10	5	298	37
		A/Kola	10	5	298	37
		Zing	10	5	298	37
2. Gassol, Donga, Ibbi and Wukari	4	Gassol	12	6	322	41
		Donga	10	5	298	37
3. Takum, Bali, Gashaka, Kurmi and Ussa	5	Bali	11	6	322	40
		Ussa	11	6	322	40
		Takum	11	6	322	40
4. Sardauna	1	Sardauna	11	6	322	40
Total	**16**	**9**	**96**	**50**	**2802**	**350**

Source: Field Survey (2017).

Data for this study were obtained from both primary and secondary sources. Primary data were obtained from the participants of input voucher programme (respondents) through the use of structured questionnaire administered with help of trained enumerators.

3.1 Analytical Techniques

The analytical techniques used were descriptive statistics that included frequency, percentage and mean. Also, paired comparison (T-test) was used to analyze the hypothesis of the study. The paired sample test was employed to determine whether any significant differences exist between the participants mean farm income before and during the programme. This tested the hypothesis of the study. The paired sample (t-test) model is expressed as follows:

$$T = \frac{Md}{Ste_{\bar{X}}} \quad \ldots\ldots\ldots (2)$$

Where,
T = computed t- value for the farm incomes
Md = mean differences of the farm incomes
$Ste_{\bar{X}}$ = Standard error of difference between means of farm income

IV. Results and Discussion

4.1 Socio-economic characteristics of the participants

The results in Table 2 showed that most (60.40%) of the participants were within 21 to 40 years age group. Their mean age was found to be 38 years. This means that the participants were in their youthful and active age. The youthful age group is considered to be more pro change and innovative in farming technologies. This implied that the participants of voucher programme were active and innovative in the newly introduced input delivery programme to enhance farming as means of livelihood. This agreed with the findings of Bunde *et al*. (2014) that more of the smallholder farmers that participated in input voucher programme in Kenya were youths. Table 1 also showed that majority (60.8%) of the participants were males while 39.20% were found to be females, which means more of the programme participants were males. This could be due to the gender roles in decision making in farm livelihood activities, such as access to production inputs as fertilizers and land. This is similar to studies (Akangbe *et al*., 2012; Adesiji *et al*., 2015) who found male dominance in agricultural projects studied in Oyo and Kwara States, Nigeria respectively.

Table 2further revealed that greater numbers of the respondents (69.20%) were formally educated with secondary and tertiary education. This means that the farmers were literate enough to comprehend the use of voucher system of input distribution using their mobile phones. This implied that the participants are more likely to comprehend the use of input vouchers and extension trainings on fertilizers practices. This is more likely to result in higher adoption levels, increased crop yields and farm incomes and thus enhanced livelihood. The finding is in line with the assertion that more literate farmers possessed secondary and tertiary education reported as Akangbe *et al*. (2012) in their study on effects of Fadama II project in Oyo State, Nigeria.

The household size of the participants as shown in Table 1 indicated that over 80% of the respondents had between 1 to 10 members and few (3.6%) had 16 to 20 members as household size. The mean household size was 7people. Household membership is an indication of the availability of family labour likely to contribute to the farming enterprise as major source of family livelihood. This means that there was available family labour to undertake farm livelihood activities, such as transportation and fertilizer applications, weeding and harvestings. This might reduce farm production cost and a resultant effect in higher farm incomes of the respondents. This result is in conformity with that by Adesiji *et al*. (2015) who reported 7 persons as mean household size accounted for the dominant participants of their study.

Furthermore, majority (68.31%) of the participants had farming experiences between 6 to 15 years. The mean farming experience was 10.5 years. This was an indication of possession of considerable length of time in farming enterprise. This implied that the participants had better knowledge and skills to be more confident in participating in the programme. Their agricultural knowledge (i.e. human assets) might facilitate building their capacity and skills in fertilizer application, adoption and increased crop out and farm livelihood incomes.

The results presented in Table 2 indicated that higher proportion (70.9%) of the participants opined to have had easy access to extension services while 29.1% said they had no access. This means the project participants had more access to extension services. The implication is that available extension services could impact knowledge, being human capital assets in livelihood. This will more likely provide the needed skills and trainings to the farmers on the use of fertilizer technologies being promoted in the programme. The result was in line with Ayandiji and Olofinsayo (2015) who found that majority of their respondents had access to extension services in Ondo State, Nigeria.

Entries in Table 2 revealed that majority (79.7%) of the participants affirmed that they belonged to farmers associations while 20.10% said they did not. This result means that most of the participants were members of farmer associations. The implication of this is that farmer organization is seen as a social asset that plays significant role in influencing farmers' decision to possibly participate in a new programme through group interactions with other farmers and change agents. This is important, probably because the associations provided them a platform to interact and share their experiences on livelihood activities with one another.

Table 2 also showed that most (94.50%) of the participants had access to input voucher redemption centers in their areas while 5.50% of them said they had difficult access. Thus, it means that input vouchers redemption centers were established within the close vicinity of residence of the project participants. The implication is that the farmers are more likely to find it easier to transport fertilizers to their houses and farms. This might be at more reduced costs than in the previous government direct input programmes, where farmers had to travel long distance, such as to their Local Government headquarters to obtain fertilizers at high transportation cost. The reduction likely increased their farm income, assets owned and with resultant effects on livelihood. Waithaka *et al*. (2007) found in Kenya that the amount of inputs used by farmers declined with increasing distance to the nearest input market.

The participants' annual farm income before and during programme were presented in Table 1. It showed the annual farm income before programme was reported by 29.10% by respondents to fall within the income group of less than ₦100,000. The participants that fall within the income group of ₦100,000 to ₦200,000 per annum was 46.20% and 23.30% was in the income range of ₦200,001 to ₦300,000. The respondents had a mean annual farm income of ₦153,052 before the programme. However, during the programme they had a mean income of ₦242,883.72, which means that there was an increase in mean income of about ₦89,832. This result implied that input vouchers resulted in higher income of the participants. The higher incomes resulted in assets owned. Ezeh *et al*. (2008) in their study of inorganic fertilizer consumption among smallholder farmers in Abia State, Nigeria noted that farmers would be more disposed to purchase and use more fertilizers when their income increases.

4.2 Effect of Agricultural Input Voucher Programme on Participants' Farm Income

Table 3 presented the average farm income level of the respondents from rice and maize production before and during the programme. This showed that the farm income realized in rice production before the programme was estimated at ₦151, 239.50 and during the programme it was ₦287, 936.89. This implied an increase of 90.38%. More so, the average annual farm income from maize production slightly differed by 6.64%. This was from ₦181, 204.13 before the programme, to ₦193, 277.49 during the programme. This

indicated that the programme had effect on the farm income of the participants. The implication of this, is that the participants' livelihood would more likely improve. This would be through meeting basic family needs, such as shelter, education and health care. The results of this study were similar to the findings of Adebayo and Olagunju (2015) who observed that the farm income of the participants was ₦50, 361.66k more than that of their counter parts in the counter factual. Also, it was in agreement that 47.79% increase in annual farm income by Danjuma *et al*., (2016) who indicated in a report on the socio-economical impact study of Fadama III project in Taraba State, Nigeria. These findings indicated that agricultural interventions, if successfully implemented could improve the income of the participants.

Furthermore, Table 3 presented the paired sample test results on the hypothesis which stated that there is no significant difference between the participants' income level before and during the programme. The null hypothesis was rejected for the rice income level and the alternative hypothesis accepted. This signified that there was a significant difference (t=2.99; p=0.01) between the income obtained from rice. This implied that the farm income obtained from rice had high effect on the farmers' livelihood, which may be attributed to its production for commercial purposes. However, the paired comparison test results showed no significant difference (t=-1.39) in the mean income level obtained from maize. This may be explained by the reasons that most of the maize produce obtained was more possibly used for home consumption or given as gifts with little sold to generate significant incomes. It implied that the incomes obtained from rice did not have much effect on the farmers' livelihood.

4.3 Effect of Agricultural Input Voucher Programme on Participants Assets

The results in Table 4 presented the types and number of assets owned by the participants before and during the programme. It showed increase in the number of livestock and poultry assets namely: cattle (75%), sheep (100%), goats (100%) and pigs (120%). The poultry included chickens (117%), broilers (117%), chicks (100%), cockerel (94%), ducks (64%) and turkey (63%). The mean differences suggested that these assets were more in number during the programme. Small ruminant animals were considered to be important assets to the smallholder farmers. This is because they serve as an investment or banks for the smallholder farmers to save his farm income which may be used to meet short or long term family needs, such as feeding, education and medical care. The poultry can serve as source of food (animal protein), and can easily be sold to meet immediate or pressing needs of the households. Mutambara *et al*. (2013) have found in Zimbabwe that input programme supports to beneficiaries significantly increased their livestock, such as chickens and goats. Mapila *et al*. (2012) also, reported a significant increase in the number of livestock owned by farmers in Malawi as a result of participation in input voucher programme.

Furthermore, the results showed changes in the number of farm equipment assets. These increases were in Ox-plough (100%), wheel barrow (100%), knapsack-sprayer (150%) and farm matchet (133%).The other increases observed were water pumps and grinding mills that increased by 100% each respectively, cutlass (60%) and hoes (67%). The increases could be attributed to the voucher programme resulting from increase in income. These assets are likely to enhance the farmer's agricultural production activities. Adesiji *et al*. (2015) in his report showed more increased in the productive assets (farm equipment) compared with the non participants of Fadama II projects.

In addition, household and electronic appliances such as radio, cellphone, Television, refrigerators, fans and charcoal iron were found to increase by 100% each. Others like electric iron and kerosene stoves that slightly increased by 50% each respectively. These increases may be explained by the income generated from participation in the input voucher programme. The radios and televisions will probably help the farmers to receive agricultural information that is broadcasted in the media. Also, prices of farm inputs and farm produce from various markets could be transmitted via these media. The cell phones were more needed in receiving messages on the date and time to redeem vouchers for inputs. Kato (2013) observed that there were better improvements in the respondents' household appliances where an input subsidy programme was implemented compared to where it was not in Tanzania.

V. Conclusion

In Nigeria smallholder farmers dominate agricultural production as means of livelihood. In order to improve agricultural productivity governments, both at the federal and state levels have been subsidizing improved inputs, such as seeds and fertilizers. However, the use of agricultural inputs, especially fertilizers had been low mostly among smallholder farmers arising largely due to poor targeting in distribution programme. With the objective of improving smallholder access and use of fertilizers and seeds, the government of Nigeria have introduced an input voucher programme in 2012. This involves using a mobile phone- based delivery method targeting mainly the smallholder farmers. This study was therefore designed to assess the effect of agricultural input voucher programme on the livelihood of smallholder farmers in Taraba State, Nigeria. The empirical findings from the study showed that smallholder farmers that participated in the programme increased

their farm incomes from rice and maize by 90.38 % and 6.64 % respectively. Also, a significant difference was observed between the participants mean farm incomes in rice before and during their participation. These results suggested that AIVP enabled the farmers to improve their productivity and eventually increased incomes. The results on effect of AIVP on the participant's assets ownership revealed an increase, ranging from 30% to 150 % in various assets, such as animals, farm equipment and house hold appliances. This is an indication that the programme enhanced the participants livelihood assets. In conclusion, the AIVP positively impacted on the smallholder farmer's livelihood in Taraba State, Nigeria. This study recommended the sustainability of the programme in order to improve the livelihood of smallholder farmers. Finally, the voucher approach should be adopted by stakeholders in agriculture when implementing interventions directed at the smallholder farmers as beneficiaries.

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Table 2 Socio-Economic Characteristics of the Participants (n=344)

Variables	Frequency	Percentage (%)	Mean
Age (Years)			
≤ 20	7	2.00	38
21-30	126	36.00	
31-40	84	24.40	
41-50	81	23.50	
>50	46	13.20	
Sex			
Male	209	60.80	
Female	135	39.20	
Education			
Informal	42	12.20	
Primary	64	18.67	
Secondary	135	39.20	
Tertiary	103	30.00	
Household Size			
≤5	158	45.90	7
6-10	151	43.90	
11-15	23	6.70	
16 and above	12	3.50	
Farming Experience			
1-5	53	15.40	10.5
6-10	127	36.91	
11-15	108	31.40	
16-20	38	11.04	
≥20	18	5.20	
Extension Access			
Had access	244	70.90	
Had no access	100	29.10	
Membership of Association			
Member	274	79.70	
Not member	69	20.10	
Access to Redemption Center			
Had access	325	94.50	
Had No access	19	5.50	
Annual Income (₦)			
(a) Before			
<100,000	100	29.10	153,052
100,000-200,000	159	46.20	
200,001-300,000	80	23.30	
300,001-400,000	2	6.00	
>400,000	3	9.00	
(b) During			
<100,000	50	14.50	242,884
100,000-200,000	96	27.90	
200,001-300,000	145	42.20	
300,001-400,000	40	11.60	
>400,000	13	3.80	

Source: Field Survey Data, 2017.

Table 3 Distribution of Participants' Farm Income during and before the Programme

Crop Type	Income (₦)					
	During AIVP	Before AIVP	Difference ₦	Percentage Difference (%)	Mean Difference	T-Values
Rice	287,936.89	151,239.50	136,697.39	90.38	136,006.96	-2.99***
Maize	193,227.49	181,204.13	12,023.36	6.64	237,17.39	-1.39NS

Source: Field Survey Data, 2017

***** = Significant at 1% level; NS=Not Significant**

Table 4 Distribution of Participants Assets Ownership during and before Programme

Asset Type	Number Owned		Difference	Percentage Difference (%)	
	During AIVP	Before AIVP			Mean difference
Livestock					
Cattle	7	4	3	75	3.59
Sheep	10	5	5	100	4.97
Goat	12	6	6	100	5.41
Pigs	11	5	6	100	7.74
Chickens	26	12	14	117	13.89
Broilers	76	35	41	117	38.25
Layers	21	16	5	31	5.52
Cockerel	91	47	44	94	44.15
Ducks	36	22	14	64	14.22
Chicks	67	52	15	100	15.23
Turkey	13	8	5	63	4.77
Farm Equipment					
OX-Plough	4	2	2	100	2.30
Wheel barrow	4	2	2	100	2.30
Knapsack Sprayer	5	2	3	150	2.70
Cutlass	8	5	3	60	3.20
Hoes	15	9	6	67	5.60
Machetes	7	3	4	133	4.20
Water Pump	2	1	1	100	0.60
Grinding Mill	2	1	1	100	0.70
House Appliance/Electronic					
Radio	2	1	1	100	1.00
Cell Phone	2	1	1	100	0.80
Television	2	1	1	100	0.50
Refrigerator	2	1	1	100	1.50
Electric Iron	3	2	1	50	1.20
Fan	2	1	1	100	1.30
Charcoal Iron	2	1	1	100	0.00
Kerosene Stove	3	2	1	50	1.40

Source: Field Survey, 2017.

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