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Evaluation of West African Agricultural Productivity Programme in the Institute of Agricultural Research and Training Adopted Villages

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Abstract

This study examined gaps and gains of WAAPP interventions on the agricultural productivity of farmers in IAR&T-adopted villages of southwest Nigeria. Purposively, 4 adopted villages where the WAAPP project was implemented were selected and a total of 138 farmers were interviewed. With the use of a questionnaire, the study assessed the impact of WAAPP project on the specific agricultural needs of villages, determined agricultural productivity for crop and livestock enterprises and identified challenges associated with the intervention. Linear regression model, variance analysis, and t-test were used to achieve the study objectives. Major gaps identified in WAAPP activities were inconsistencies in operation ($\bar{x}$= 2.36), limited market access ($\bar{x}$= 2.35) and poor communication with members ($\bar{x}$= 2.35). Significant differences also existed in the

impact of WAAPP intervention among villages (F= 5.103), and enterprise type (F=4.553). Sex (β = 0.373), age (β = 0.312) and enterprise type (β = 0.365) were major contributors to productivity in WAAPP. The paper concludes that WAAPP interventions in adopted villages had a positive impact on crop and livestock productions of beneficiaries, though constraints by inconsistencies in operation, intra-communication and limited market access. The study recommends continuous funding and monitoring of agricultural activities by WAAPP to broaden the impact of the intervention.

Introduction

Nigeria has about 70% of its population engaged in farming and mostly smallholders, cultivating on less than 50% of agricultural land using outdated techniques thereby leading to insufficient output supply for the increasing population (Fowowe, 2020). The low yield of agricultural production is compounded by a variety of other problems such as poor access to modern inputs and credit, poor infrastructure, inadequate access to markets, land and environmental degradation.

There has been a projected increase in the global population and a 30% increase in Africa's population (Mechiche-Alami and Abdi, 2020) by the year 2050 which would likely meet with declining agricultural production. Thus, there should be strategies to increase production to avert food insecurity and meet up with the Sustainable Development Goal (SDG) 2 of Zero hunger.

The adopted village model was initiated in Nigeria in 2009 to increase agricultural production through group formation in local institutions (Azunna, 2019). Local institutions shape political action, social interactions, as well as economic choices and outcomes in the daily lives of the rural people in the country. Collective action in natural resource management is a key feature of smallholder farmer systems. In reality, problems faced by smallholder farmers are crosscutting in scope, and require the cooperation of various stakeholders (Abdul-Rahaman and Abdulai, 2018). However, weak rural grassroots institutions could hamper the adoption of agricultural information due to low capacity and limited knowledge-sharing abilities. This situation hampers the adoption of sustainable agricultural practices and food security in Nigeria.

Therefore, to ensure favourable livelihood outcomes for the rural population, there is a need to integrate agricultural commodity-based groups for increased productivity. Effective connections among rural institutions promote the flow of labour, market, capital and necessary information (Azunna, 2019). Ensuring the effectiveness of communication flow among groups also aids the adoption of agricultural information (Fadairo, 2020). Enabling rural institution in the form of farming community groups is critical to improving the livelihood of farmers and enabling information dissemination. Training to ensure both capacity and enterprise development will enhance market participatory knowledge and will also create a favourable platform for knowledge sharing. This was achieved through the establishment of villages and groups adopted by institutions under the West African Agricultural Productivity Programme (WAAPP) for information sharing (Ogunsumi, 2013).

At the onset, the WAAPP aimed to achieve the Millennium Development Goal (MDG) of reducing the number of hungry people by 50% by 2015. With these objectives, WAAPP

– Nigeria kicked off in 2012 to provide enabling conditions for Nigeria to cooperate with countries in the West African Sub-region in Technology Generation and Dissemination among others.

The purpose of projects executed by WAAPP in the Institute of Agricultural Research and Training (IAR&T) was to bring improved agriculture to the doorsteps of farmers affordably and attractively. This is to raise the declining productivity which has eroded the competitiveness of African agricultural products. The WAAPP is a regional programme funded mostly by the World Bank, Spain, Denmark and Japan, aimed to increase agricultural productivity, promote regional integration among the participating countries, and support the generation and dissemination of technologies (WAAPP Newsletter, 2018). The Federal Government of Nigeria joined the WAAPP in 2012 to revolutionalise the agricultural sector which was derailing from its normal contribution to the Gross Domestic Product (GDP) (Adeogun and Agwu, 2019). The programme would improve farmer's knowledge of the use of modern farm work for increased productivity, improved livelihood and supply of prompt and relevant assistance and information (Ogunsumi, 2013; Fadairo and Keita, 2021)

WAAPP interventions in IAR&T-adopted villages include the supply of agricultural inputs (fertilizers and seeds), basic rural development (Borehole and biogas digester supply), establishing farmers along crop and livestock value chains (cassava processing and poultry production), market linkages for produce and training in modern and integrated farming systems. Despite the intensity of the dissemination to meet the criteria of WAAPP, evaluation of activities and impact of interventions on enterprise productivity have not been carried out. This study, therefore, aims to evaluate agricultural productivity before and after these interventions in beneficiary villages and improve on existing research to gain insight into the relevance of agricultural interventions among farmers in promoting agricultural productivity for increasing populations

Purpose of the study:

The study examined the gaps and gains of WAAPP interventions on farmers' agricultural productivity in the IAR&T-adopted villages in southwest Nigeria.
Specifically the study:

- described agricultural activities of WAAPP beneficiaries
- examined the intervention's benefit to farmers
- determined contributions of farm factors and institutional variables to productivity
- determined the change in agricultural productivity influenced by WAAPP intervention; and
- identified the challenges associated with the intervention

Methodology

The study was carried out in the adopted villages of the Institute of Agricultural Research and Training. The Institute of Agricultural Research and Training is a multi-commodity Research Institute as well as a zonal coordinating Institute located in Ibadan Southwest, Nigeria. The Institute is one of the Research Institutes under the Agricultural Research Council of Nigeria (ARCN). The Institute has eight (8) adopted villages across the Southwest zone, where research activities are first disseminated, depending on the

specifications of the groups in the villages. However, this study purposively selected 4 (four) villages where West Africa Agricultural Productivity Programmes (WAAPP) were implemented. The study targeted every member of the WAAPP group which comprised 150 in Oniyo, 50 in Aborishade, 50 in Alabata 45 in Apete. However, a total of 138 members (respondents) who were available and indicated willingness for the survey were sampled. This figure comprised of 33 in Alabata, 32 in Apete, 31 in Oniyo and 42 in Aborisade. The study design is purposive of WAAPP beneficiaries in adopted villages.

Data were collected using a structured questionnaire. The dependent variable was productivity for both crop and livestock activities as influenced by WAAPP interventions. Productivity was measured as the total output in kilogrammes for crops and the number of livestock enterprises divided by the input also measured in kilogrammes. The productivity was calculated as the computed figure decimated by the total number of respondents. Data on specific agricultural needs of the villages, the extent of benefits from the interventions available, constraints and productivity as well as benefits were measured on a scale of four – high, medium, low and none- with a score of 3, 2, 1 and 0 assigned accordingly. Likewise, challenges associated with the WAAPP intervention were measured on a scale of three (3) – very severe, less severe and not a challenge. Responses were ranked according to the mean calculated. The mean benefit for each of the interventions was determined and ranked from 1 – 8 based on the number of interventions in villages by WAAPP

A linear regression model was used to ascertain the n contributions of factors that had direct relationships with farmers' input and output in the study areas. Sex (Female 1 and Male 0) and marital status (Married 1 otherwise 0) were used as dummy variables in the analysis. The differences in mean productivity for the respondents in crops, livestock and combined enterprises across the four villages were determined.

Results and Discussion

Description of Farmers and Farm Activities of WAAPP Beneficiaries

Table 1 shows that each adopted group had an average of 43 members comprising Males ($\bar{x}$ = 21) and females ($\bar{x}$=15). Intervention activities were eight (8) in the villages, however, an average of four interventions had intensity among members. This implies that farmers benefited from only half or less of WAAPP intervention among the specified group. The average input (seeds and fertilizers) before intervention was 190kg, with an output of 1165 kg for crop producers. With WAAPP intervention, these figures increased to 220kg and 7,160kg respectively. The implication of this result is WAAPP farmers took advantage of the intervention to increase production in the area. An increase in Input could mean improved access to seeds and fertilizers either at a subsidized rate or gift by WAAPP, resulting in increased output. Furthermore, the average livestock number per farmer before intervention was eight (8) which increased to 17 after intervention. This finding indicates that WAAPP intervention targeted both crop and livestock farmers among the group in the villages. The average farm size was 2.5 hectares. Low yield is the most critical factor affecting the profitability and competitiveness of smallholder farmers (Kamara, 2019).

Table 1: Agricultural activities of group beneficiaries of WAAPP

Variables	Mean	SD	Min	Max
Group membership	43 members	19.8	14	135
Male membership	21 members	15.26	1	90
Female membership	15 members	13.09	1	50
WAAPP intervention benefit	4	2.7	1	8
Input before (Kg)	190kg	260kg	0	1520
Input after (kg)	220kg	250	10.5	1500
Output before (kg)	1,165	400	0	7000
Output after (kg)	7,160	1029	10	7500
Income before (Naira)	162,821	40,04	20,000	300,000
Income after (Naira)	254,115	26,86	240,000	350000
Farm size (hectares)	2.5	1.9	1	16
Livestock number before	8	4.2	0	15
Livestock number after	17	17.9	5	70

Benefits derived from WAAPP interventions among participants

Table 2 shows that community boreholes ($\bar{x}$= 2.34) provided by WAAPP had more intensity than the other interventions; this was closely followed by market linkages ($\bar{x}$= 2.28) for produce and bio-gas provided ($\bar{x}$= 2.10). The least beneficial project was the provision of technical knowledge on poultry production ($\bar{x}$=.1.72). These results show the farmers' acceptability of the interventions and the relative relevance of the enterprises. One of the strongest motivations for farmers to adopt sustainable practices is the perceived benefits for their farms, the environment or both (Piñeiro et al., 2020). Empowering rural farming households for the market would lead to greater productive investment and spending, and potentially create a household-level multiplier effect (Daidone et al., 2023).

Table 2: Benefits derived from WAAPP intervention among participants

Intervention	Mean	SD
Provision of community Boreholes	2.34	1.22
Facilitation of Market Access	2.28	0.9
Financial Empowerment of Participants	2.10	0.8
Bio – Gas provision for electricity supply	2.10	1.1

Cassava Processing Facilities	1.97	2.2
Training on specific needs	1.87	0.82
Provision of Inputs for farmers	1.81	0.83
Technical knowledge of Poultry Production	1.72	0.84

Factors that Influenced the Productivity of Participants

Table 3 shows a significant influence of the sex of farmers (β = 0.373), age of respondents (β = 0.312), household size (β = -0.239) and type of enterprise (β = 0.267). Active participation of the male participants in the WAAPP contributed more to the productivity of agricultural enterprises. Each group had more male participants than females. This implies that interventions were most likely tailored towards male interests than female members of the group. This was corroborated by Leslie et al., (2019) that males are more likely to benefit from agricultural interventions than females, unless when specifically defined. The Table furthermore reveals the negative direction of the influence of household size on productivity. The result implies a decrease in productivity with an additional person to the family. Crop production increases overall productivity in all the villages. Furthermore, factors such as marital status, years of schooling experience, the village type and livestock raised among others had no significant contribution to productivity.

Table 3: Contribution of socio-economic and institutional variables to the productivity of farmers in the WAAPP intervention

Variables	Beta	T-Values
Sex (Male)	0.373	3.854*
Village	-0.052	-0.473
Age of respondents	0.312	3.107*
Marital status (married)	0.058	0.638
Household size	-0.239	-2.593*
Years spent in School	0.066	0.738
Agricultural enterprise (crop)	0.267	2.830
Participation	0.070	0.741
Size of farm (Hectares)	0.267	0.830
Crop type	0.071	0.780
Livestock raised	0.079	0.797
Village	0.006	0.060

*P≤0.05.R=0.494, R^2=0.244, Adjusted R square=0.144, Std Error=9.08016

Agricultural enterprise productivity of farmers

Table 4 shows the calculated productivity of both crop and livestock farmers in the villages sampled. The table shows a positive change in enterprise productivity among farmers in the villages after the intervention. An exception was the case of Alabata village where the productivity was reduced for crop production with the intervention. Several factors influence sustainable agricultural production in rural areas, some of which are rural-urban migration, urbanization, and effective participation and communication (Jayne et al., 2019; Cai et al., 2021). Any of these identified factors could have interfered with the Intervention process in the affected village. However, the result amplifies the importance of agricultural intervention in increased productivity.

Table 4: Productivity of crop and livestock enterprise before and after WAAPP intervention

Village	Crop (Kg)		Livestock		Crop-Livestock (Kg)	
	Before	After	Before	After	Before	After
Aborishade	24.7	62.3	28.8	50.3	37.3	49.9
Alabata	37.6	20.0	26.2	38.1	18.6	26.7
Apete Onidoko	23.7	49.0	14.6	19.4	54.5	99.1
Oniyo	8.8	48.6	75.6	87.1	52.9	67.7

(Computation in Excel using actual figures in Kg and livestock heads)

Differences in Productivity among Villages for Crop and Livestock Production before and after Intervention

Table 5 shows a significant difference ($p \leq 0.05$, $F= 3.327$) in crop production among farmers in the villages before the intervention but no difference after ($p \geq 0.05$, $F=0.637$). This suggests different levels of production efficiencies for crop and livestock enterprises in the villages before WAAPP which were influenced by the WAAPP intervention. A priori, the intervention identified the needs of each community using Participatory Rural Appraisals (PRA) and interventions targeted identified gaps.

There was a difference in productivity among livestock farmers in the four villages sampled. The mean difference in the production was significant despite the WAAPP intervention (Before - $F= 5.343$ and After - $F= 5.673$). There was also a significant difference in the productivity along individual crops assessed (cassava, maize, soybean and cowpea) among the farmers. This result implies that each village benefitted significantly in crop and livestock production and in community development from WAAPP intervention at different levels.

Table 5: Differences in crop and livestock farmers' productivity among the four WAAPP-adopted villages (Oniyo, Alabata, Aborishade and Apete)

Productivity	Groups	Df	Mean square	F
Crop before	Between	3	3844.346	3.327*
	Within	117	1651.928	
	Total	120		
Crop after	Between	3	8694.259	0.568
	Within	117	15308.565	
	Total	120		
Livestock before	Between	3	36774.816	5.343**
	Within	26	6886.813	
	Total	29		
Livestock after	Between	3	38613.223	5.673**
	Within	26	6806.277	
	Total	29		

*P≤ 0.05

Challenges Associated with the WAAPP Interventions

Table 6 shows some gaps in the implementation of WAAPP interventions among the beneficiaries. The stated constraints generally expressed farmers' unmet expectations from WAAPP and factors that constrained agricultural productivity as expected by WAAP. Inconsistencies in the implementation of activities ($\bar{x}$=2.36), Poor communication with members ($\bar{x}$= 2.35) and limited market access ($\bar{x}$=2.35) for produce ranked highest among the identified constraints. Eitzinger et al. (2019) identified two-way communication with the provider of interventions and efficient interactions among farmers as key to the functionality of rural development interventions. This result amplifies the importance of intra-communication in the processing and adoption of agricultural innovation as affirmed by Salam and Khan (2020). On the other hand, the stoppage of funds by donor agencies and the invasion of farms by herdsmen were the least challenging to agricultural productivity in the communities. This implies an effective role played by IAR&T, the management institution, in sustaining relationships with the communities to ensure the broader impact of WAAPP interventions. Also, the gradual effect of local security outfits in mitigating herder invasion into farms in South-western Nigeria seems to be yielding a positive result (Aderinto et al, 2019), which is expected to have a positive effect on productivity in the communities.

Table 6: Challenges associated with WAAPP intervention among beneficiaries

Challenges	Mean	SD
Inconsistency in WAAPP activities	2.36	0.69
Lack of follow-up on facilities and participants	1.94	0.59
Poor monitoring of the platform created for effectiveness	2.23	0.59
Inadequate support for the maintenance of intervention facilities	1.82	0.78
Lack of market for crops and other products from the intervention	1.86	0.63
The bad condition of roads that link the intervention communities to towns and cities	1.65	0.78
Stoppage of funding by the donor agency.	1.46	0.65
Removal of other institutional supports	1.79	0.59
Lack of transparency among members	1.91	0.77
Poor communication with members	2.35	0.67
Limited market access	2.35	0.59
Poor maintenance culture among participants	1.71	0.70
Invasion of farms and communities by herdsmen	1.56	0.73

Conclusion and Recommendations

Farmers benefited from all the interventions targeted at increasing productivity in the villages. Inconsistencies in implementation and poor intra-communication marred the full potential of the impact of the project. Older farmers benefitted more from WAAPP while increasing household size reduced productivity. The WAAPP intervention also improved access to production factors for crop production in villages. The study thus recommends consistent funding and monitoring of agricultural intervention by the West Africa Agricultural Productivity Programme and the Federal Government of Nigeria to sustain the impact of interventions among beneficiaries. Also, anchors of WAAPP activities in villages should ensure effective intra and intercommunication processes during the implementation to allow participation in the processing and for easy uptake of innovation.

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