

INVESTIGATING THE WEST AFRICA AGRICULTURAL PRODUCTIVITY PROGRAMME FOR EFFECTIVENESS AMONG MAIZE FARMERS IN MAMOU, REPUBLIC OF GUINEA

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Abstract

The West Africa Agricultural Productivity Programme (WAAPP) is an agricultural and development agenda aimed at reducing hunger and poverty amongst the ECOWAS nations. Maize is an emphasis crop being promoted by the WAAPP, Republic of Guinea. The WAAPP was therefore investigated for Context, Input, Process and Product (CIPP) effectiveness among maize farmers in Mamou, Republic of Guinea. A total of 176 beneficiary maize farmers were selected through a three-stage sampling procedure, and information was obtained using a well-structured interview schedule. Data were analysed using mean, t-test and Pearson Product Moment Correlation (PPMC) at $\alpha_{0.05}$. Subsidy on fertilizer, supply of improved maize seeds, training on pest management and fertiliser application were the most accessed project deliverables. The context-input, process and product phases of the project objective hierarchy were rated effective, with average yield of 1.37 tonnes/ha among beneficiaries, compared to the national average of 1.29tonnes/ha. Farmers' perceived effectiveness of the WAAPP significantly correlated with maize yield. Hence, the WAAPP in Guinea is concluded to be characterized by consistency, ensuring that the identified maize production needs were sufficiently addressed, resulting in improved yield.

Key words: *perceived effectiveness, agricultural interventions, improved maize productions*

INTRODUCTION

Maize is one of the most important cereal crops in Sub-Saharan Africa (SSA) owing to its proven contribution to food security. [13] argues that with rice and wheat, maize is one of the three most important cereal crop in the world. An estimated 208 million people in SSA depend on maize as a source of food security and economic wellbeing, occupying more than 33 million ha of SSA's estimated 200 million ha of cultivated land. Considering the low average maize grain yields that are still pervasive in farmer's fields, meeting the projected increase in demand for maize grain in Africa presents a challenge. The 2010-2013 FAO data show that the total harvested is close to 0.7 million hectares, with annual production of nearly 1.5 million metric tons. Maize is one of the most important cereal crops grown in Guinea and one of the main crops to which policies and donor-funded interventions are often directed. In area

cultivated, maize ranks third after rice and fonio (millets with small grain). It is one of the main crops produced in Guinea and its production expanded over some few years in the past reaching up to 700,000 MT around 2016, and by 2018, up to 819,000 MT [22]. However, in the recent past, the demand for maize has risen in a consistent manner in Guinea, leaving a huge deficit demand-supply deficit. This has been linked to, among other factors, population increase, intense competition from livestock farmers and other key actors, whose finished products depend on maize grain as a raw material. Some of these products include food industries like corn flakes, custard, flour mills, and distilleries, among others. Reports have revealed [5] that an estimated 60 percent of maize supply is used for animal feed, and only 15–17 percent (or about 100,000 MT) is used for human consumption. Reports have also shown that although, productivity of common cereals has fluctuated over the past few

decades, it witnessed a more of consistent decline from 1967 at 1.502 to 1.167 tonnes per hectare as of 2017, a far-cry compared to Ghana's 1.873 t/ha, Nigeria's 1.462 t/ha and Cote d'Ivoire's 2.148 t/ha [21]. This reflects the presence of a weak institutional capacity and inefficient framework for technological and scientific breakthroughs at improving domestic production. This perhaps explains the reason for a widening demand-supply gap. Slow pace of growth and poor productivity of maize in Guinea has also been attributed to factors such as climate change, inadequate agricultural technologies, pests and disease attack on crops, underfunding of extension services [7], among others.

The National programme of agricultural investment and food security (*Programme National d'Investissement de la Sécurité Alimentaire, PNIASA*) is one of the many critical components of the Government's Agricultural More Production [11]. The Ministry of Agriculture is in charge of providing support services to farmers in line with the provisions in the policy directions of the government. These supports are in the forms of agricultural campaigns, provision of subsidies on agricultural inputs like fertilizer, seed and agro-chemical to the farmers in order to increase yield, enhance farmers' income and promote national and household food security. The ministry also partners with international development organisations to implement specific agricultural programmes in line with clearly specified mandates. Maize is one of the target crops due to its direct role for economic growth, first as an important food security crop, and second, as a source of raw materials for industry.

Specific programmes have also been designed and implemented in successions. However, available information on the trajectories of food security situation in the country over the past years indicates that no significant improvements have been achieved as productivity did not improve significantly [8]. There have also been recent and ongoing efforts as a consequence of partnership between the government and international development agencies. One of such includes the current Guinea Poverty Reduction

Strategy of the country's Agricultural Development Policy, through which platform the West African Agricultural Productivity Programme (WAAPP), Guinea, is being accommodated. The WAAPP is a poverty and hunger reduction intervention mainstreamed by the Economic Community of West African States (ECOWAS) in line with the Sustainable Development Goals 1 and 2 [18]. It is partly funded by the World Bank and partner countries and aims to develop a more productive and sustainable agricultural sector in 13 West African countries in order to ensure future food security [16]. The strategy is with the objective of achieving 6% agricultural growth and increasing food production and supply in West Africa, and works in collaboration with scientists, researchers, extension workers and farmers. In Guinea, the programme is being directly implemented under the supervision of the Ministry of Agriculture. The intervention provides assistance on three priority areas of which maize is key. It provides subsidies on maize inputs as a way of motivating maize farmers and other farmers; as well as complimentary advisory services. The WAAPP is implemented at the national level and targets specific regions according to their agro-ecological potential and market access and maize was categorized under priority food crop, which also included rice, poultry (egg), potato, and farmed fish (fresh and smoked) [17]. Mamou region of Guinea is known for intensive cultivation of maize. The WAAPP implementation for maize started in 2007, and expected to wind up in December, 2019.

It has been years into the implementation of the WAAPP; and available information suggests that the intervention may have only yielded marginal dividends. For example, [6] data reveals that the aggregate maize output in 2019 estimated at 871,000 tonnes was about 14 percent above the annual average figure. However, in spite of the 2019 above-average production, import requirements for the 2019/20 peak season are forecast at above-average level of 765,000 tonnes. Although, the improvement, no doubt can be interpreted to mean positive implication for a better food security situation, however, an

aggregate of 113,000 people have been estimated by [6] as severely food insecure as at March 2020. The situation is expected to grow worse to 267,000 people between June and August 2020 [6]. These are however generic statistics and can hardly be used as a reliable metrics upon which the WAAPP intervention can be assessed for performance. An enterprise-specific assessment of the WAAPP efforts based on emphasis crops and livestock is surely a step closer to evaluating the attainment of the overall programme's goals.

Evaluations of programmes and related interventions have in the past been conducted using different designs, with objective indicators often favoured ahead of the subjective. The former being the estimation of the actual value of the outcome indicator (in this case, maize yield) while the latter is often referred to an assessment of the extent to which stakeholders, in most cases, beneficiaries, perceive the intervention to have yielded desired result. However, use of subjective approach is often considered most suitable for situations where more than one programmes are implemented across the same beneficiaries, due to the obvious difficulty in making inferences for causality. One of the most commonly used approaches in such case is through the feedback from direct beneficiaries as an expression of satisfaction, or otherwise, with the implementation procedure and eventual outcomes [3, 4]. A combination of these two methods can however be employed so as to eliminate or reduce measurement/instrument bias through triangulation. A significant correlation between the objective and subjective indicators will therefore be an indication of congruence in this case. It is therefore on the basis of the foregoing that it becomes important to investigate the extent to which the WAAP followed the expected implementation procedures as indicated in maize yield and hence as perceived by farmers. A dearth of such empirical investigation in both methodological approach and result therefore necessitates this study. Answers were sought to the following research questions.

(i) What are the project deliverables to which the WAAPP beneficiaries had access?

(ii) How effective do farmers rate the context, input, process and product (outcome) implementation of the WAAPP?

(iii) How does maize yield of farmers correlate with effectiveness indicators (input, process

Theoretical framework

The study is explained by the Context, Input, Process and Product (CIPP). The CIPP model is a programme evaluation model developed by Daniel Leroy Stufflebeam and his colleagues in the 1960s. It is a model that requires the evaluation of context, input, process and product in judging a project's value. It is designed to systematically guide evaluators and stakeholders in posing relevant questions and conducting assessments at the beginning of a project, while it is in progress and at its end. According to the model, an evaluation is defined as a systematic investigation of the value of a programme [14]. Context evaluation, for example emphasizes an assessment of the situations in terms of needs and opportunities within a defined context [15]. Input evaluation on the other hand provides information for determining the resources used to meet the goals of the program [9]. Such resources sometimes may include human, social, physical, natural and human. Process evaluation addresses the questions of whether the inputs are being put into appropriate use and in such a way that will help the programme achieve the intended objectives. The Product phase is the assessment of the extent to which the goals of the programme has been achieved. It measures, interprets and judges a project's outcomes based on their merit, worth, significance and probity. The study uses this theory to guide the evaluation process for the WAAPP for improved maize production in Mamou, Guinea.

MATERIALS AND METHODS

Study area and sampling procedure

According to the administrative division, the prefecture of Mamou is the capital of the Administrative Region of which it counts in total 13 local areas, plus the urban

communities which are Timbo, Porédaka, Dounet, Boulliwel, Tolo, Konkouré, Saramoussaya, Gongoré, Soyah, Ouré-Kaba, Niagara, Kégnéko and Tégouéréya. Mamou prefecture covers an area of 8,000 km² with a population of 236,326 inhabitants, including 121,326 women and 114,964 men, and an average population density of 30 per km². It is bounded in the South by Sierraleone; in the North by the prefectures of Tougué and Dalaba; in the East by the prefectures of Faranah and Dabola; in the West by that of Kindia. Its geomorphological unit is characterized by high plateaus of Fouta Djallon whose soils remain lateritic. Fulani, Dialonke, and a minority of Malinke, Sousou and foresters are the main ethnic groups of the prefecture. The most popular economic activities are handicrafts, farming which include maize, fruit and vegetable production, extensive livestock farming, fonio, sweet potato, peanut, , cassava. Also, it is a region with a privileged geographical position, a crossroad between the different regions of the country and between the countries bordering the North and the South. Domestic production is particularly important for some speculations.

The population for the study consisted of the all maize farmers beneficiaries of WAAPP in Mamou. Three Local Government Areas (LGAs) out of thirteen in Mamou where maize farming is the major activity and where the WAAPP for maize are being implemented were purposively selected. The selected local government areas were Soumbalako, Tolo and Dounet. Thereafter, a total of seven communities (50%) were randomly selected across the sampled LGAs, making two, three and two from Sumbalako (from 3), Dounet (from 5) and Tolo (from 4) communities, respectively. There is an average of 25 farmer organization in each of the seven selected communities, with an average membership size of 20. Five (20%) of Farmer organisation was then selected in each community, giving a total of 35 organizations across the seven communities. With an average of 20 members, five farmers (25%) were also randomly selected from each organization. This makes a total of 175 respondents

sampled in all for the study. The data for the study was collected using structured interview schedule to elicit information from maize farmers in the different communities.

Measurement of variables and analysis of data

In measuring project deliverables respondents had access to, farmers indicated from a list of items, the programme deliverable(s) to which they had access to by indicating 'yes' for access and 'no' for non-access, with scores of 2 and 1 assigned, respectively. Yield of maize was measured in local measuring scale and converted to Kilogramme and Tonnage equivalents. Effectiveness as perceived by beneficiaries was measured by asking respondents to indicate the effectiveness of the WAAPP on maize on a 10-point rating scale where, 0 indicates not effective and 10 represents maximum effectiveness for each item. Effectiveness was measured for the context-input, process and product (outcome) phases of the project execution process as guided by the CIPP Model. Score for effectiveness was then computed and used in the test of hypotheses. Descriptive statistical tools such as frequency counts, percentages, and Pearson Product Moment Correlation were used to test the hypotheses. All hypotheses were tested 5% level of significance.

RESULTS AND DISCUSSIONS

Project deliverables to which farmers have access

The result in Table 1 shows deliverables in ranking order of access by respondents. Improved maize seed was ranked most accessed benefits by WAAPP intervention beneficiaries. This is consistent with the World Bank report [16] that WAAPP delivered 10,500 tons of seeds to up to 200,000 farmers in Guinea and two other countries. Access to improved seed was followed by subsidy on fertilizer and intensive agricultural campaign which rank second and third, respectively. Respondents however ranked provision of small irrigation machine and training on irrigation crop farming as the second least accessed project deliverables,

respectively. This result is an indication that the WAAPP intervention programme on maize is geared towards making basic inputs of direct consequences to maize production available. In this case, fertilizer and improved maize varieties being rated first further underscores that low productivity was the chief maize production challenge for which interventions like WAAPP became important (Table 1).

Table 1. Project deliverables to which farmers have access in the intervention programmes

Input subsidy	Mean	Rank
Subsidy on Fertilizer	1.91	2
Access to improved maize seed	1.95	1
Agricultural Campaign	1.91	2
Phyto sanitary products	0.75	5
Small irrigation machine	0.49	8
Agricultural tools for maize	0.90	4
Water availability for domestic use	0.71	7
Information on irrigation for dry season maize farming	0.73	6
Education/advisory services		
Training to the Farmers on best maize agronomic practices	0.99	3
Research service on improve maize varieties	0.73	6
On-farm Extension service	0.96	4
Improved maize pest management practices	1.32	1
Improved maize diseases management practices	0.95	5
Fertilizer application techniques	1.18	2
Information on improve seed sourcing	0.74	7
Training on livelihood diversification	0.56	8

Source: Field survey, 2019.

Project deliverables also include the education sub-objective. The result reveals that training on improved maize pest management practices, fertilizer application techniques, and best maize agronomic practices were identified as the most accessed education-related deliverables.

This further indicates that farmers were provided with corresponding agronomic education on the appropriate handling of inputs which were provided. This result is consistent with the general objective of the WAAPP which is to improve productivity by increasing access to improved seeds, other agricultural inputs and dissemination of

innovations among actors, among other support services [20].

Maize yield (ton/ha)

Using the Guinea's current maize yield average of 1.29 tonnes/ha [23] as the benchmark, the study categorised farmers into high level of productivity (score \geq benchmark value) and low level (scores $<$ benchmark score) as shown in Table 2. The result reveals that majority (60.2%) of the respondents were categorized as having high maize yield, as against 39.2 which recorded low maize yield. This in an indication that the project has improved the yield of maize and this is expected to translate to improvement in farming household members' welfare. The result shows consistency with the average yield of 1.37 tonnes/ha among beneficiaries, which is a significant improvement over the overall 1.29 tonnes/ha, recorded as the national average. This result concurs with [17] which affirmed that the maize production in Guinea had grown by 13 percent from 2011. However, the result further implies that a lot more efforts is required to scale up production beyond the current level considering the value is still below the average yield index for the SSA region which according to [1]'s assertion was way below appropriate.

Effectiveness of the WAAPP

Context-input effectiveness

The result reveals that appropriate targeting of beneficiary was ranked as the first most perceived context-input effectiveness indicator, followed by needs assessment/identification of problems. Inputs and advisory services being delivered in the most acceptable way was ranked third, followed by input supply meeting the needs of the maize farmers. This is an indication that the implementation of WAAPP is guided by the sound knowledge of the importance of agricultural input [10] and support services [12] to agricultural productivity. Decision making process and appropriateness of description of modalities for collection of deliverables were the least ranked indicators for WAAPP effectiveness by farmers. The result is an indication that the WAAPP must have taken to the bottom-up approach for design and execution of intervention, which is

participatory in nature and important for sustainability. It is therefore an indication that the programme is addressing farmers' needs for the present time, and also not undermining economic, social and environmental needs and capabilities of the future generation. This argument concurs with the [20] where the Programme underscores the importance of demand-driven technology generation and adoption process which the Programme adopts in its implementation process (Table 2).

Table 2. Perceived context and input effectiveness of the WAAPP

Items	Mean	Rank
Targeting of beneficiaries	9.90	1
Needs assessment/identification	8.20	2
Soil testing and assessment	3.90	6
Participation of stakeholders	3.65	7
Decision making process	3.25	8
Description of modalities for collection of deliverables	4.15	5
Inputs and advisory delivered in the most acceptable way	6.95	3
Adequate of input to meet maize farmers' needs	5.55	4

Source: Field survey, 2019.

Process effectiveness

Process effectiveness comes next to the context and input effectiveness as guided by the CIPP Model. The result of the analysis reveals that input supply met the needs of the maize farmers as it ranked first. The programme also improved farmers' knowledge of best agronomic practices, and as well improved access to fertilizer among farmers, as these ranked second and third indicators, respectively. The result on process effectiveness gives credence to the result obtained for context-input effectiveness (Table 3) as it translates to the required effective process, which is also expected to engender attainment of intervention goals. It is also an indication that both the input and educational services provided by the WAAPP yielded the desired immediate dividend. It is noteworthy, however, that the process phase of the WAAPP intervention is pivotal and direct to improved productivity of maize which is the focal goal of the programme, without which the programme's overall

objectives cannot be achieved, even under very favourable external factors.

Table 3. Process effectiveness of maize intervention programmes of WAAPP

Indicators	Mean	Rank
Training on pests and disease management	4.15	6
Input supply meet the needs of the maize farmers	6.40	1
Functional link to source of credit facilities	4.65	5
Appropriateness of fertilizer supply for the local soil	5.80	4
Improved farmers knowledge of best agronomic practices for maize	6.25	2
Access to fertilizer	6.10	3
Training on improved crop production	5.35	6
Subsidy on basic farm input	5.55	5

Source: Field survey, 2019,

Product effectiveness of the WAAPP

The study reveals in Table 4 that increased maize productivity, low incidence of pests and diseases, and higher profit margin were the most rated indicators of product effectiveness of the WAAPP among maize farmers in the study area. This result simply indicates that the WAAPP intervention was able to, through a carefully-planned and well-monitored process, achieve improved productivity and hence profit making from the maize production enterprise. This is expected to also have direct positive effect on poverty among the farming population, as well as improve the food security of the nation, if the project is scaled up to cover bigger geographical space and beneficiaries, following a similar, but improved implementation procedure. The result is consistent with the claims by the WAAPP [19] that the intervention increased, by 34%, the economic situation of farmers as well as transformed communities. This argument is also consistent with the [16] document on implementation of WAAPP which indicated agricultural productivity as the main impact target as enshrined in the project's Theory of Change. It also aligns with the initial philosophy of the programme which seeks to fight hunger and poverty in line with the United Nations' Sustainable Development Goals 2 and 1, respectively [18].

Table 4. Product effectiveness of WAAPP on maize

Indicators	Mean	Rank
Increased productivity	6.70	1
Improved market participation	5.30	7
Higher profit margin	6.15	3
Increase income level	5.15	8
Improved socio-economic development	5.90	4
Flood control benefits	3.10	6
Low incidence of maize disease infestation	5.55	5
Low incidence of pest	6.45	2

Source: Field survey, 2019.

Relationship between project deliverables and effectiveness WAAPP maize intervention programme

The study reveals (Table 5) that there is significant relationship ($r = 0.708$) between project deliverables which respondents accessed from maize intervention programme. This is an indication that the more the respondents accessed the deliverables in inputs and advisory services, the more effective the programmes were rated. This is an indication that the programme is characterized by consistency, ensuring that the benefits accessed by beneficiaries addressed the identified needs. Also, the study reveals a significant relationship between respondents' perceived effectiveness of the programme and maize productivity, which is an indication that the more effective the programme was perceived, the more productive the farmers were. This therefore is an indication of causality by coherence as explained by [2]. This result further shows that since majority of the respondents perceived the WAAPP intervention on maize to be effective, about the same proportion had recorded high level of productivity in their maize production enterprise.

Table 5. Project deliverables and perceived effectiveness

Relationship	r	P
Project deliverables and effectiveness	0.708**	0.000
Yield and perceived effectiveness:		
- Input	0.345**	0.000
-Process	0.186*	0.027
- Product (outcome)	0.237**	0.005
-Overall effectiveness	0.269**	0.001

*significant at 5%, **significant at 1%

Source: Field survey, 2019.

CONCLUSIONS

The study infers and concludes that the WAAPP programme achieved moderate levels of effectiveness as established by the favourable feed-back from farmers. The study further establishes that farmers' favourable perceived effectiveness of the WAAPP programme was not unconnected with improved yield which majority achieved in their maize production enterprises. Finally, based on the coherence achieved in the two approaches to determining the effectiveness of the WAAPP intervention for an improved maize production, the intervention is hereby concluded to be effective. Therefore, on the basis of these conclusions, the following recommendations are considered important:

- (i) Input subsidy should be considered an important agricultural policy content and as such policy direction and legislation should incorporate seamless access to inputs among farmers and implementation should be pursued by the government with requisite commitment;
- (ii) Government agricultural interventions should adopt a demand-driven process for a much participatory, result-oriented and sustainable effort;
- (iii) Agricultural interventions should not only put emphasis on dissemination and/or transfer of agricultural technologies to perceived end-users, requisite trainings and advisory services for an appropriate deployment of such technologies should form an integral component of such efforts.

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