



## **IMPACT OF POTATO VALUE CHAIN SUPPORT PROJECT (PS-PVCSP) AMONG BENEFICIARIES IN PLATEAU STATE, NIGERIA**

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### **ABSTRACT**

The study examined the impact of Potato Value Chain Support Project (PVCSP) among beneficiaries in Plateau State, Nigeria. A multi-stage sampling technique was used in selecting 390 respondents. Data were collected using structured questionnaire and were analysed using descriptive statistics and propensity score matching. The result revealed that, the major actors in the Irish potato value chain were producers (48.21%) and marketers (3.8%). Advisory services (42.5%) and inputs support (25.64%) were the major support provided by the project. The results further indicated a mean difference in the yield after the project of 9,916.78kg/ha and a mean income of ₦468,568.06 difference after the project. The major constraints to the project implementation were high cost of the fungicide promoted (57.2%), none participation of the right people in the project (54.6%), corruption (52.1%) and high cost of fertilizer (47.9%) among others. It was concluded that the PS-PVCSP had positive impact on the respondents' income and yield. In addition, there was significant increase in potato cultivation after the project. Based on the result of this study, farm inputs such as fertilizer and other chemicals should be made available and affordable to farmers. Beneficiaries should be encouraged to form cooperative societies to access loans and procure inputs to enjoy economics of scale.

**Keywords:** Value chain, Support and Project.

### **INTRODUCTION**

Potato is critical to food security and sustenance of livelihoods of subsistent farmers, especially in the highlands areas where its growth can be economically sustained (Amadi, *et al*; 2021). Potato (*Solanum tuberosum*) is a tuber crop grown to supplement staple food commodities particularly the cereal crops and also add to the household economy through increased income to farmers. It is a major source of income for the rural farmers in many African communities. It originated and was first domesticated in the Andes Mountains of South America (IPC, 2015) and brought to Nigeria due to activities of tin miners in Plateau state whom found that the climatic condition of the state was ideal for the growth of the crop. Value chain is the full range of activities which are required to bring a product or service from conception, through the different phases of production, transformation and delivery to final consumers (Joshi and Gurung, 2009). The National Policies on agricultural food production in Nigeria has made several efforts to increase food production in order to meet the food security objectives to self-sufficiency in staple food production especially rice, maize, tuber crops among others in Nigeria (Ayoola, 2017).

To perform range of activities; number of economic actors are expected to participate along the chain. The value chain approach starts at an understanding of the consumers' demand and works its way back through distribution channels to different stages of production, processing and marketing (Getachew, 2015). A particular stage in a value chain may affect and be affected by the stage before or after it (Anandajayasekaram and Berhanu, 2009). Promotion of value



chains in agribusiness aims to improve the competitiveness of agriculture in national and international markets and to generate greater value added within the country or region (GTZ, 2006).

The Plateau State Potato Value Chain Support Project (PS-PVCP) is an off-shoot of Fadama II Project Implemented from 2004 to June, 2013 and supported by the African Development Bank (AfDB). The project was conceived based on the impressive performance of Plateau State Project Office came first among other States of Borno, Katsina, Jigawa and Kogi that participated in Fadama II Project. This necessitated the Federal Ministry of Finance (FMoF), the Federal Ministry of Agriculture and Rural Development (FMARD) and the African Development Bank (AfDB) to consider channelling the unutilized funds into a single State Project called Potato Value Chain Project because Plateau State produces over 90% of the Potato in the Country. The project become disbursement effective in November, 2017 and was closed in December, 2022. Value chain interventions have the potential to advance both economic and social outcomes (Devaux *et al.*, 2018), and therefore have become an increasingly integral part of rural development strategies across governments, donors and NGOs. Evidence suggests that value chain interventions have been successful within development contexts to stimulate economic growth, improve industry competitiveness and reduce poverty (Stoian *et al.*, 2012). Yet, the context-specific nature of value chain interventions poses a conceptual and practical barrier when attempting to link strategies to outcomes. It is evident that the complex nature of chains requires interventions to be shaped to the context of the chains they target (Donovan *et al.*, 2015; Orr, 2018).

Irish potato is underexploited in Nigeria, despite its wide cultivation in commercial quantities (Muhammad *et al.*, 2016) and potential to improve food security, income and human nutrition (Schulte-Geldermann 2013). Several efforts have been devoted to the development and transfer of new technologies to improve Irish potato production in Nigeria. These include Irish potato seed multiplication, training of farmers, Irish potato research, breeding and selection of new improved varieties (Zemba *et al.*, 2013). There have been efforts made by the government to improve productivity and market performance of potato but the results are not that much promising. This can be attributed to many factors like inadequate technical and managerial production skills, poor contract enforcement (weak institutional framework), imperfections in the marketing chain and very few market related institutions and weak infrastructure (Ekwe, 2019). Previous research on Irish potato focused on agronomic practices, marketing efficiency, growth and crop productivity (Okonkwo *et al.*, 2009; Wuyep *et al.*, 2013; Zemba *et al.*, 2013; Sanusi *et al.*, 2017) However, there is little studies that examined the impact of the value support project made on the beneficiaries in Plateau State. Specific to the Plateau State region, studies have not been conducted on the determinants factors influencing adoption of the PS-PVCSP. This research intends to address the gap in the literature by providing information on the factors influencing the projects recommended technologies among beneficiaries in Plateau State, Nigeria. This study was carried out to identify the major potato value chain actors in the state, describe the type of support provided by the project, determine the impact of the project on the yield and income of beneficiaries and identify the constraints to the implementation of potato value chain support project in the study area.

## **MATERIALS AND METHODS**

### **The Study Area**

Plateau State is one of the 36 states that make up the Federal Republic of Nigeria, including the Federal Capital Territory, Abuja. The State is located in the north-central zone of Nigeria and located between latitude 8°24' N and 10°30' N and longitude 8°32' E and 10°38' E



(Plateau State, 2022). It has an estimated population of 3,178,712 (NPC 2006), and based on the annual population growth rate of 3.2%, the projected population of the State is about 4,864,480 million people in 2023 and 4,807,509 people in 2023. The State is bounded by Kaduna and Bauchi states to the north, Taraba on the east and Nassarawa to the south and west with a landmass covering 30,913 square kilometres. Plateau State was created on 3<sup>rd</sup> February, 1976, from Benue-Plateau, with its administrative headquarters in Jos. It is structured into 17 Local Government Areas (LGAs).

The Plateau rises to about 250 feet (1600m) above sea level which gives it high potentials in Irish potato production. Kaguongo *et al.*, (2013) reported that potato is mostly grown on a high altitude of areas between 1500 and 300, and the Benue River-Valley stretches along the south-east border. Plateau State has a near temperate climate with an average temperature of between 13°C and 22°C, (FAO, 2019). Based on soils, climate and typical farming systems, the state is classified into three distinct agro-ecological zones, namely; the moist lowland savannah, which falls within southern Guinea and Savannah rain forest, having extensive low-lying flat land with high water holding capacity favourable for the production of rice, yam, cassava, melon and groundnut. The mid-latitude zone falls within 500-1,500 meters above sea level, with soils that are sandy clay and heavy rains, while predominantly maize, Irish potato, and assorted vegetables and produced (FAO, 2019).

The state falls within the Northern Guinea Savannah zone and characterized by two distinct wet and dry seasons. The wet season starts in late April and ends in October, while the dry season starts in November and ends mid-April. The mean annual rainfall is about 1450mm, and relative humidity of 60%. The mean monthly maximum and minimum temperatures are 20°C and 15°C, respectively (FAO, 2019).

Plateau State is primarily an agrarian community. The State has a land mass of 30,913 square km or 6,678,162 acres with two thirds of the land area is arable (National Bureau of Statistics, 2016). The major food crops include Irish potatoes, sweet potatoes, chili pepper tomatoes and strawberry. Others include leafy vegetables, cereals, legumes and root and tuber crops and tree crops. Vegetables include carrots, lettuce, radish, cucumber, sweet pepper, hot pepper, green beans, parsley and fruits include strawberries. However, cereal production on the Plateau represents about 34% of all agricultural produce; root and tubers production represents about 32 % while horticultural crops stand out at about 21%. The least is forest products which represent 13% (Wassihun *et al.* 2019).

The main cash crops grown in the area aside Irish Potato include maize, yam, rice, cassava, guinea corn, apples, grapes, wheat, barley and many other exotic crops. (Gambo *et al.*, 2017). In the areas of solid minerals, the state is equally endowed tremendously, as it can boast of commercial and large scale availability of the following minerals; Tin, Zircon, (Galena, Tantalite, Gemstones, Monazite, Columbite, Kaoline etc. Also the state produces a lot of agricultural products, excess of which are sold and transported to other parts of the country and for exports (Plateau State, 2016).

### **Sampling Technique and Sampling Size**

A multi-stage sampling procedure was used for the selection of the respondents for the study. In the first stage, Plateau state was selected for the study. In the second stage, all the 11 beneficiary Local Government Areas were purposively selected because they were the areas of project intervention, the selected LGAs were Bassa, Barkin Ladi, Bokokos, Jos East, Jos South, Jos North, Langtang North, Mangu, Pankshin, Riyom, and Shendam. In the third and final stage, 0.5% of the beneficiaries were randomly selected making a total 390 respondents as the sample size for the study. The sampling frame is the list of beneficiaries of PS-PVCSP obtained from the project office.



**Table 9: Sampling Size Determination Plan**

State	LGA	Sample Frame	Sample Size (0.5%)
Plateau	Bassa	6,987	35
	Barkin Ladi	9,882	49
	Bokkos	12,508	63
	Jos East	5,041	25
	Jos South	7,405	37
	Jos North	2,504	13
	Langtang North	4,160	20
	Mangu	11,984	60
	Pankshin	5,017	25
	Riyom	7,509	38
	Shendam	5,003	25
<b>Total</b>		<b>78,000</b>	<b>390</b>

Source: PS-PVCSP Office (2022)

### Data Collection and Analysis

The study used primary data which were collected using a structured questionnaire that was administered to the beneficiaries of Potato Value Chain Support Project in the study area. Information on the major value chain actors in the study area, type of support provided by the project's intervention and impact of the project on yield and income of beneficiaries as well as constraints faced by the beneficiaries in the project implementation. The collected data were analysed with using descriptive and inferential statistics. Descriptive statistics such as frequency, percentage and mean were used to achieve objective i, ii and v while propensity matching score (PMS) was used to achieve objective iii.

## RESULTS AND DISCUSSION

### Major Potato Value Chain Actors in the Study Area

Value chain describe the series of activities that add value to a commodity from input supply, production, processing, storage and marketing. Value chain actors are stakeholders or participants in the various stages of the production, processing, marketing, distribution as a product moves from the producer to the consumer, a number of transformations and transactions take place along a chain of interrelated activities, and value is added successively at each stage of the chain (Lilian, *et al.*, 2011). As shown in Table 2 major actors in potato value chain were the producers (48.21%), marketers (23.8%) and processors (18.97%). Other value chain actors include inputs suppliers (6.41%) and transporters (3.33%). Accordingly, the findings revealed that majority of the value chain actors were producers and marketers of potato in the study area. Thus, it is expected that production and marketing technologies will be adopted by the actors. Value occurs when needs are met through the provision of products, resources, or services (Andrew. *et.al.* 2016). Thus, it can be seen that potato value adding activities were performed by chain actors at different stages of the commodity. According to the survey result (Riisgaard *et al.*, 2019) in Jabi Tehinan District of Ghana, the most value added in the potato chain next to the collectors. However, in South Africa retailers, the most value was added next to the processors whereas producers added least value.





**Table 2: Distribution of Respondents' According to Potato Value Chain Actors (n= 390)**

Category of actors	Frequency	Percentage
Agro-input suppliers	25	6.41
Producers/Farmers	188	48.21
Processors	74	18.97
Marketers	90	23.08
Transporters	13	3.33

Source: Field Survey, 2022

### **Respondents' type of support received from the project**

Different types of support cater to different needs and challenges faced by farmers, and a combination of these supports can be more effective in driving adoption. The result of various support received from the project was presented in Table 3. The result revealed that a reasonable proportion (42.5%) of the respondents received advisory and 25.64% received agro-inputs support. The finding also revealed that 12.31% received linkage support and 2.56% received infrastructural support in the study area. De-Janvry and Sadoulet, (2020) reported that, the development of value chains that contribute to linking smallholder farmers to markets can promote inclusion of the rural poor and offer opportunities in terms of labour for a growing population of young people, women, and men that need to actively engage in income generation. This implies that efforts to promote and strengthen these supports can have a positive impact on adoption and increase potato production in the study area. Such support can provide farmers with access to larger markets, better prices, and more opportunities for income generation. In addition, the support received by this demographic can be a key driver for youth engagement in agriculture, which is essential for the long-term prosperity of agricultural development.

**Table 3: Type of Support Received from the PS-PVCSP Project (n= 390)**

Type of support	Frequency	Percentage
Agro-input support	100	25.64
Financial support	68	17.44
Linkages	48	12.31
Infrastructure support	10	2.56
Advisory services	164	42.05

Source: Field Survey, 2022

### **Impact of the project intervention on income of the beneficiaries**

Income denotes the total revenue that accrues to an individual firm within a given period. The higher the income levels of the farmer, the higher the capacity for adoption (Ekong, 1988). The income levels of the beneficiaries were examined before and after the PL-PVCSP. The results in Table 4 indicates that the average income realized after the project among the five major actors across the potato value chain was more than 100% higher (₦876,145.05) than before (₦407,577). This higher increase in income is attributable to the positive impact of the Plateau State Potato Value Chain Support Project on the farmers' production and other value chain activities. The mean difference in the income before and after was ₦468,568.06. This implies that higher income has been realized by the beneficiaries thus translating to better condition of living by the participating farmers. This is in line with Tologbonse (2013) who reported that development project had impact on the income of the participating women



farmers. In contrast to this result, a recent analysis of research concerning the influence of agricultural value chains on marginalized communities in Washington arrives at a different conclusion. It suggests that while there is some evidence supporting the idea that small-scale farmers could see a rise in their business profits, this uptake might not necessarily lead to an overall boost in household income. One possible reason for this is that household income is a more dismal outcome (Dunn, 2014).

**Table 4: Impact of the Project Intervention on Income (₦) of Potato Value Chain Actors**

Value chain actors	Before Mean	After Mean	Mean Diff	T-value
Farmers	95,626.49	282,321.79	186,695.31	4.7660***
Marketers	62,371.14	148,695.33	86,324.19	3.6260***
Processors	73,551.24	135,019.93	61,468.69	6.2660***
Transporters	65,002.83	83,547.46	18,544.63	3.7310***
Agro-dealers	111,025.30	226,560.54	115,535.24	9.2970***
<b>Total</b>	<b>₦407,577</b>	<b>₦876,145.05</b>	<b>₦4685,68.06</b>	

Source: Field Survey, 2022

#### Impact of the project intervention on yield and Land Area Cultivated

Yield is an amount of products generated and obtained on an investment over a particular period of time. It is expected that higher the yield levels of the farmer, the higher the capacity for adoption (Ekong, 1988). The yield levels of the two groups were examined (in kilogram per hectare (kg/ha) before and after the value chain support project. The results in Table 5 indicates that the average yield in Irish potato realized by the project's beneficiaries was higher (24,090.22kg/ha) after the project than the yield realized before (14,173.43kg/ha). This higher increase in the yield is attributable to the impact of the project on the beneficiaries. The mean difference in the yield before and after the project was 9,916.78kg/ha. This agrees with United Nation Organization (UNO) Task Force (2014) that the impact of any project on the target beneficiaries relates to changes in crop yield and living condition of the beneficiaries flowing from and attributed to the project.

Furthermore, the table also revealed a significant difference in the area cultivated by the project beneficiaries in the study area. Area cultivated in Irish potato was significantly higher (2.90) after than before (0.51) the project. After the project there was increase in area of land cultivated among the beneficiaries than before.

**Table 5: Impact of the Project Intervention on Estimates Area Cultivated (Ha)**

Variables (n=390)	Before Mean	After Mean	Mean Diff	T-value
Yield (kg/ha)	14,173.43	24,090.22	9,916.78	5.5230***
Area Cultivated (Ha)	0.51	2.90	2.40	3.7520***

Source: Field Survey, 2022

#### Economic Situation of the Beneficiaries

Economic situation embodied the complex elements which in a given period characterize the condition or state of a community or society's ability to produce goods, services and or other resources with exchange value. The result of economic situation of the respondents was measured using before and after the project intervention on each of the



economic indicator (very poor, poor, moderate, satisfactory, good and very good). As shown in Table 6, the beneficiaries perceived that their economic situation before was moderate (7.69%), satisfactory (5.90%), good (5.13%) and very good (25.64%) increases after the project interventions to 1.79%, 16.92%, 24.36%, 25.64% and 28.72%, respectively. Similarly, the beneficiaries that were under very poor and poor economic situation before (17.69% and 37.95%) reduces to about 2.56% and 1.79% after the project intervention, respectively. The findings indicate the positive effects on the beneficiaries' situations economically. Similar finding was reported in a quasi-experimental impact assessment of three value chain interventions: horticulture, maize, and dairy in Kenya found a positive impact on poverty reduction but no statistically significant impact on household income (Oehmke *et al.*, 2010). Creevey *et al.*, (2011) found that two additional value chain program assessments with counterfactuals showed positive outcomes at the farm level with increased productivity or revenue from the sale of produce.

**Table 6: Distribution of Respondents' According to their Economic Situation (n= 390)**

Economic Situation	Before		After	
	Frequency	Percentage	Frequency	Percentage
Very Poor	69	17.69	10	2.56
Poor	148	37.95	7	1.79
Moderate	30	7.69	66	16.92
Satisfactory	23	5.90	95	24.36
Good	20	5.13	100	25.64
Very Good	100	25.64	112	28.72

Source: Field Survey, 2022

### **Constraints associated with the implementation of potato value chain support Project**

The major constraints to the projects' implementation as indicated in Table 7 were high cost of fungicide promoted (57.2%), none participation of the right people in the project (54.6%), corruption (52.1%) and high cost of the fertilizer (47.9%) and were ranked 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup>, respectively. Projects implementation constraints that ranked 5<sup>th</sup> and 6<sup>th</sup> were untimely release of funds (44.4%) and non- adaptability of the varieties provided (42.3%), respectively. Many farmers are not willing to incur extra cost transportation to potential training centers (Shiferaw *et al.*, 2016). This is evident in most collaborative projects as affirmed by Abubakar (2011) and Jamilu (2015) who reported that there was a delayed in release of funds by the State and Local Governments during the IFAD/CBARD Programme. Badaru (2022) also reported inadequate project staff, long distance to training centres to beneficiaries of IFAD Projects in Katsina State, Nigeria.

The implications of the findings in Table 7 regarding the implementation of the projects are multifaceted. Firstly, the high cost of the promoted fungicide and fertilizer, ranked as the top and fourth constraints, respectively. This underscores the financial burden borne by farmers in adopting recommended agricultural practices. This may deter smallholders from adopting these technologies, potentially limiting their access to improved yields and income. Secondly, the issue of non-participation by the right individuals in the project, ranked as the second constraint, points to the importance of targeted beneficiary selection to ensure the project's effectiveness. Additionally, the presence of corruption as the third constraint raises concerns about the misallocation of resources and potential misuse of project funds, highlighting the need for transparency and accountability in project management. Furthermore, the challenges related to untimely fund releases, non-adaptability of provided crop varieties, bureaucratic



processes, and long distances to training centres all contribute to project delays and inefficiencies. This will potentially undermine the intended benefits to farmers. The reluctance of farmers to incur extra costs for transportation to training centres, as supported by prior research, reinforces the need for projects to consider accessibility and logistical factors when planning interventions. In summary, these constraints collectively point to the importance of addressing financial, administrative, and logistical hurdles to ensure the successful implementation and impact of agricultural development projects in the study area.

**Table 7: Distribution of Respondents According to the Project Implementation Constraints (n= 390)**

Project constraints	Frequency	Percentage*	Rank
High cost of the fungicide promoted	223	57.2	1 <sup>st</sup>
None participation of the right people in the project	213	54.6	2 <sup>nd</sup>
Corruption	203	52.1	3 <sup>rd</sup>
High cost of the fertilizer	187	47.9	4 <sup>th</sup>
Untimely release of funds	173	44.4	5 <sup>th</sup>
Non- adaptability of the varieties provided	165	42.3	6 <sup>th</sup>
Bureaucratic process	158	40.5	7 <sup>th</sup>
Long distance to training centers	158	40.5	7 <sup>th</sup>
Inadequate project staff	147	37.7	8 <sup>th</sup>

Source: Field Survey, 2022

\*Multiple response

## CONCLUSION AND RECOMMENDATIONS

The study concluded that the PS-PVCS Project had positive impact on the respondents' area cultivated, yield and income as well as the economic situation of the households. Therefore, the Plateau State Potato Value Chain Support Project (PS-PVCSP) had a positive impact on the beneficiaries regarding production capabilities, yield and income level. The study made the following recommendations; The project should be designed and made attractive to meet the need of thousands of rural farmers in Plateau State for them to be able to benefit and have positive impact on their production and income realization. The success of this project can be replicated in other states of the federation. Beneficiaries should be encouraged to form cooperative societies to access to loans and inputs procurements to enjoy economy of scale. Stakeholders involved in seed multiplication and distribution should make clean and certified seeds accessible and affordable to the farmers for production. Farm inputs such as fertilizer and other chemicals should be made available and affordable to farmers by input dealers. The bureaucratic procedures in executing the actual plans of the program should be reduced in order for target beneficiaries to have easy access to project intervention. Subsequent development projects should start as planned to avoid the delay encountered at the take up of the projects as this may hamper its success due to time constraint, and finally, fund disbursement by all stakeholders should be timely and adequate. Because agricultural and community development projects are time sensitive.

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