

COSTS AND RETURNS ANALYSIS OF POTATO PRODUCTION UNDER PLATEAU STATE POTATO VALUE CHAIN SUPPORT PROJECT (PS-PVCSP)

***Kolo, A¹. & Balere, Y².**

¹*Department of Agricultural Economics and Extension, Abubakar Tafawa Balewa University Bauchi State, Nigeria*

²*Plateau Agricultural Development Programme, P.M.B. 2119 Dogon Dutse, Plateau State, Nigeria*

**Corresponding author (Email: abdulwahabkolo@gmail.com GSM:08061572214)*

ABSTRACT

The study analyzed costs and return of Irish potato production under Plateau State Potato Value Chain Support Project (PS-PVCSP). Multi-stage sampling technique was used to select 180 farmers across 17 local government areas. Descriptive statistics and gross margin were used for data analysis. The results show that male and female accounted for 57.78% and 42.22% of Irish potato production, respectively. The result indicated that 47.22% of Irish potato farmers were within age bracket of 36-45 years. The result revealed that majority (62.22%) of the farmers were married with a mean household size of 7 persons. The result also shows that 37.78% of Irish potato farmers had no formal education. The costs of production shows that cost of seed accounted for 51.39% of the total variable costs. This was followed by labour, estimated at 26.09%. Meanwhile, the cost of pesticides appears to be the least, representing less than 0.53% of the total variable cost. Farm gate sales accounted for the largest share of revenue, put at 78.57%. In all, total returns stand at ₦ 699,018.7, while gross margin stood at ₦ 382,842.7. Producers were faced with the incidence of blight, particularly in the wet season, as reported by 22.78%, followed by inadequate capital (15%) and high cost of inputs (11.67%). However, access to micro-credit could have prospect in improving the productivity of farmers and contributing to uplifting the livelihoods of disadvantaged rural farming communities. It can be concluded that Irish potato production in Plateau State is a profitable venture. It was recommended that project should enhance productivities and incomes of Irish potato farmers through provision of inputs as well as infrastructure and institutional development that will enhance capacity building of project beneficiaries and linkages to services such as credit, insurance and market.

Key words: Irish potato, Livelihoods, Production, Value Chain

INTRODUCTION

Irish potato (*Solanum tuberosum L.*) belongs to the broad categorization of tuber crops. Irish potato was first introduced in Nigeria in the late 19th Century, through missionary activities (Obigbesan, 2009). The production was encouraged by the British Colonial Government during the Second World War as the tubers were needed to feed their armed forces in West Africa. Since then, the importance of Irish potato has been widely realized such that it is now an important commodity in both local and international trades. Irish potato is about the most fruitful and efficient tuber crop in the world in terms of tuber yields and days to maturity. The crop matures in about 60 to 90 days as compared to 9 and 12 months for yam and cassava, respectively (Kaplinsky and Morris, 2001). Kudi *et al.* (2008) revealed that the Irish potato gives the highest yield per unit area among roots and tuber crops in Nigeria and that it brings more income to farmers than other roots and tuber crops. The total annual production, was estimated at 900, 000 metric tons as at 2010 (Jwanya *et al.*, 2014) per year. Okonkwo *et al.* (2009) noted that at a price of ₦50, 000 per tonne of potato tuber, Nigeria earns over ₦45 billion from sales in the local markets and West African sub-region. Although, production of potato has increased by over 120% in the last 10 years in Nigeria (FAO, 2013), it is still grossly below demand. Apart from low quality seed and poor storage facilities, diseases, particularly blight are also a limiting factor to potato production in Nigeria (Sani *et al.*, 2015).

The production and marketing of Irish potato in the highland zones of Plateau State has become an integral part of the rural economy, both at the rainy and dry seasons, as it is cultivated as rain-fed and dry season crop (Sani *et al.*, 2015). According to Okonkwo *et al.* (1995), planting of rain-fed potato takes place from late March to August depending on local conditions while harvest occurs three to four months later, from July to November. Irrigated production starts from late October through January with harvest between January and April. The attraction to potato production in the state is largely driven by economic benefits.

Irish Potato is important for its contribution to food security and as source of cash income for large proportion of the rural households. However, improving access of potato farmers to the markets and active engagement in the Irish potato value chain are key issues in the study area. Generally, farmers' motivation for cultivating potato is to ensure adequate food supply during food shortage months. It is the best staple food crop during this period, as well as an important source of cash income (Gebremedhin *et al.*, 2013) because of its ability to provide a high yield of high-quality product per unit of input with a shorter crop cycle than major cereal crops like maize (Adane *et al.*, 2010). Irish potato is considered a strategic crop by the Plateau State Government targeted at achieving food security and economic benefits to the state and the country at large (Chris, 2013).

The key challenges across the potato value chain in the state include inadequate access to and usage of improved agro-inputs, limited rural infrastructure and institutions, limited value addition, inefficient system for enforcing quality standards, poor knowledge of target market, prevalence of diseases and pests, amongst others. In spite of these challenges, investment in potato value chain development in the state provides an opportunity for redressing the negative trend in key development outcomes in the state, including, diminished incomes of value chain actors, prevalence of poverty, limited employment creation, potato export and foreign exchange earnings. Therefore, the Plateau State Potato Value Chain Support Project (PS-PVCSP) aims to contribute to employment generation and shared wealth creation along the potato commodity value chain, as well as food security to increase access to rural infrastructure. There has been growing pressure on the governments and project implementers to be accountable and be more responsive to the demands of the citizens and other stakeholders, through showcasing the effect and impact of development interventions, through policies, projects and programmes. This will improve population growth, increase in potatoes production can improve the livelihoods of smallholder potato value chain actors across the state.

Plateau State needs to expand its crop base to meet the growing demand for staple foods for the increasing population. Potatoes offer a good candidate both as a commercial and food security crop. The increase in population coupled with the anticipated fast development of cities and towns following the recent devolution in the country lay a strong basis for promotion of potatoes as a source of fast foods desired in towns. To meet the growing demand for potatoes which is a major constituent of fast foods like chips and crisps, there is need to address factors constraining the production especially of the most popular varieties. The purpose of this study was to avail socio-economic information and other underlying factors that affect Irish potato production. Therefore, the aim of the study was to analyze costs and returns of potato production under Plateau State potato value chain support project (PS-PVCSP). The specific objectives were to:

- i. describe the socio-economics characteristics of Irish potato farmers in the study area
- ii. determine the costs and returns associated with Irish potato production in the study area
- iii. describe the constraints associated with marketing of Irish potato in the study area

MATERIALS AND METHODS

THE STUDY AREA

The study was carried out in Plateau State which is the twelfth largest state of Nigeria; roughly located in the center of the country. It is geographically unique in Nigeria because its boundaries totally surround the Jos Plateau, having the Jos Plateau totally in its central and northern parts, with capital in Jos. It has a population of around 3.5 million people. The state is located between latitude 9°10' N and longitude 9°45' E. The altitude ranges from around 1,200 meters (about 4000 feet) to a peak of 1,829 meters above sea level in the Shere Hills range near Jos. Though situated

in the tropical zone, a higher altitude means that the state has a near temperate climate with an average temperature of between 18°C and 22°C. Harmattan winds cause the coldest weather between December and February. The warmest temperatures usually occur in the dry season months of March and April. The mean annual rainfall varies from 131.75 cm in the southern part to 146 cm on the Plateau. The highest rainfall is recorded during the wet season months of July and August. The upland nature of the state makes it the source of many rivers in northern Nigeria, including the Kaduna, Gongola, Hadejia and Yobe rivers. The state share boundaries with Bauchi State to the North East, Kaduna State to the North West, Nasarawa State to the South West and Taraba State to the South East. The state has an estimated area of 26,899 square kilometers.

SAMPLING TECHNIQUES AND SAMPLE SIZE

The sampling technique was multi-stage, which consisted of purposive and simple random sampling techniques. The first stage 9 LGAs out of 17 LGAs were purposively selected based on quantity of Irish potato production. Second stage, two communities were selected from each LGA. While in the final stage, the Yamane sample size determination formula was used to select 180 PVCSP beneficiaries at 5% precision level and 95% confidence level from the available profiles of the potato value chain actors.

$$n = \frac{N}{1+N(e^2)} \quad \dots(1)$$

where;

n= Sample size,

N= Population size and

e= level of precision

DATA COLLECTION AND ANALYSIS

Data were collected with aid of structured questionnaire. There are many analytical techniques available for use in research of this nature, and the choice of a particular one depends on the type of data collected in order to achieve the specified objectives. Descriptive statistics and inferential statistics (Gross margin and multiple linear regression analysis) were used for data analysis

GROSS MARGIN ANALYSIS

Olukosi and Ehrabor (2008) defined gross margin as the difference between total revenue and total variable costs. It is used as a measure of enterprise profitability and means of selecting farm plans. The size of gross margin depends on the services provided, market structure, market price, perishability of the product as well as the distance between producers and consumers and may be influenced by market information especially for short-run margins. According to Olukosi and Ehrabor (2008) Gross Margin Analysis (GMA) is one of the widely used analytical techniques for planning and analysis of projects by researchers. Therefore, Gross Margin Analysis (GMA) was used to estimate profit for Irish potato production. GM was calculated using the following formula:

$$GM = \sum P_i Q_i - \sum C_j X_j \quad \dots(2)$$

where;

GM = Gross Margin

P_i = Unit price of Irish potato i

Q_i = Quantity of Irish potato produced i

C_j = Unit variable cost of input j

X_j = Quantity of input used

$P_i Q_i$ = Revenue

$C_j X_j$ = Variable cost

RESULTS AND DISCUSSION

SOCIO-ECONOMIC CHARACTERISTICS OF RESPONDENTS

The results of socio-economic characteristics of Irish potato farmers as detailed in Table 1 shows that, male and female accounted for 57.78% and 42.22% of Irish potato production, respectively. This agrees with the findings of Sani *et al.* (2015) that men always have right to land as a productive resource than women in most African societies. This result is also in line with the findings of Jwanya *et al.* (2014) who reported that male dominated Irish potato production in Plateau State, as indicated by 84.17% of the respondents. However, the results indicated that 47.22% of Irish potato farmers were within age bracket of 36-45 years and only 6.67% were above 55 years. The mean age was 38 years, the implications of these result is that farmers are still active with implications for productivity and household food security.

The result in Table 1 further, revealed that majority (62.22%) of the farmers were married and only 10% were single. The high proportion of married farmers is an indication that majority of farmers are likely to have family responsibilities and commitments, especially with regards to household food provision and upkeep, educational and health demands and savings. Furthermore, the result shows that 37.22% of farmers had household size of 6-10 persons with mean household size of 7 persons. This result is in line with the findings of Omolori (2017) who reported that most smallholder farmers in Nigeria maintained household size of between 5 and 12 persons. Large farming households has implications for household expenditures and food security and could as well be of benefit if members of the household are available for farm work.

The result on level of education of farmers under the study is also provided in Table 1. The results show that considerable proportion (37.78%) of Irish potato farmers had no formal education. The low level of formal education is likely to negatively impact on innovation, adoption of new technologies, low quality labour and farm record keeping (Adewunmi and Adebayo, 2008). The implication of this result is that PVCSP project to invest in beneficiary education, through intensive awareness creation. Aside intensifying extension support, project should endeavour to invest in disseminating technological messages in the local languages.

Table 1: Socio-economic characteristics of Irish potato farmers (n=180)

Socio-economic variables	Frequency	Percentage
Sex		
Male	104	57.78
Female	76	42.22
Age		
<25	25	13.89
25-35	40	22.22
36-45	85	47.22
46-55	18	10.00
>55	12	6.67
Mean	38	
Marital status		
Single	18	10.00
Married	112	62.22
Divorced/Separated	10	5.56
Widow/Widower	40	22.22
Household size		
<5	52	28.89
6-10	67	37.22
11-15	33	18.33
16-20	20	11.11
>20	8	4.44
Mean	7	
Level of education		
Post-Secondary School Certificate	14	7.78
Secondary School Certificate	66	36.67
Primary School Certificate	32	17.78
No formal education	68	37.78
Total	180	100

Source: Field survey, 2018

COSTS AND RETURN FOR IRISH POTATO PRODUCTION ENTERPRISE PER HECTARE

Table 2 presents the costs and return profiles of potato production in the study area. A cursory review of the costs of production shows that seed accounted for 51.39% of the total variable costs. This was followed by labour, estimated at 26.09%. Jwanya *et al.* (2014) affirmed that potato seeds and labour accounted for 56.58% and 15.91% of the costs of production under irrigation. This agrees with the findings of Obigbesan (2009) who reported that high cost of seeds, fertilizer and labor are the major challenges in Irish potato industry in most developing African countries. Meanwhile, the cost of

pesticides appears to be the least, representing less than 0.53% of the total variable cost. Farm gate sales accounted for the largest share of revenue, put at 78.57%. In all, total returns stand at ₦ 699,018.7, while gross margin stood at ₦ 382,842.7. Despite the cost of seeds Irish potato production

Table 2: Costs and return for Irish potato production enterprise per hectare

Variable inputs	Costs	Percentage
Seeds (Kg)	162,481.07	51.39
Labour (Man-hour)	82,492.31	26.09
Fertilizers (Kg)	50,757.98	16.05
Transportation	11,245.03	3.56
Pesticide for storage	1,689.59	0.53
Packaging bags	7,510.00	2.38
A. Total Valuable Cost	316,175.98	100.00
Farm gates Sales	784,915.21	78.57
Seeds sold	171,535.09	17.17
Home consumption	17,440.51	1.75
Gifts/alms	25,127.85	2.52
B. Returns	699,018.66	100.00
Gross margin (B –A)	382,842.68	

Source: Field survey, 2018

CONSTRAINTS ASSOCIATED WITH IRISH POTATO PRODUCTION

The constraints faced by farmers are presented in Table 3. Producers were faced with the incidence of blight, particularly in the wet season, as reported by 22.78%, followed by inadequate capital (15%) and high cost of inputs (11.67%). However, access to micro-credit could have prospect in improving the productivity of farmers and contributing to uplifting the livelihoods of disadvantaged rural farming communities. On the other hand, farmers were faced with constraint of poor road network, problem of insecurity and post-harvest lost among others.

Table 3: Constraints associated with Irish potato production

Constraints	Frequency	Percentage
Problem of blight	41	22.78
Inadequate capital	27	15.00
High cost of farm inputs	21	11.67
Poor road network	18	10.00
Problem of insecurity	19	10.56
Problem of post-harvest lost	14	7.78
Inadequate of storage facilities	11	6.11
Problem of land tenure system	9	5.00
Problem of climate change	7	3.89

Inadequate of dams or boreholes for irrigation	6	3.33
Lack of modern farming techniques	4	2.22
Poor marketing system	3	1.67
Total	180	100

Source: Field survey, 2018

CONCLUSION

Based on the findings of the study, it can be concluded that Irish potato production was dominated by married men with non-formal education. Despite the cost of seeds, Irish potato production in Plateau State is a profitable venture. However, farmers were faced with problem of disease. The following recommendations emerged from the study findings:

- i. Given the skewed proportion of participants in favour of the male, there is the need to enhance female participation through awareness creation and sensitization;
- ii. To effectively push the improve technologies and innovations under the project to eliminate blast diseases, it becomes imperative to enhance literacy campaigns, extension support and domicile extension messages in local languages;
- iii. To enhance production and incomes of Irish potato farmers the project should provide inputs as well as infrastructure and institutional development that will enhance capacity building of project beneficiaries and linkages to services such as credit, insurance and market.

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