Unveiling the Profitability and Livelihood Status of Small-Scale Irish Potato Farmers in Jos South L.G.A. Plateau State, Nigeria

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UNVEILING THE PROFITABILITY AND LIVELIHOOD STATUS OF SMALL-SCALE IRISH POTATO FARMERS IN JOS SOUTH L.G.A. PLATEAU STATE, NIGERIA.

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ABSTRACT

Multi-stage sampling procedure was adopted for the study to interview 120 Irish potato farmers. Gross Margin Analysis and the Household Livelihood Security Assessment (HLSA) framework were used. Results showed that 31.8% of total cost is expended on labour and 29.1% is spent on seeds. Due to blight infestation recorded for the year in review, an average output 621kg was recorded in a hectare of Irish potato land. Irish potato was found to be profitable with an average gross margin of ₦13,633 per hectare. A return on investment of 1.11 and an operating ratio of 0.90 were as well recorded to further buttress the crop's profitability. The mean livelihood status of Irish potato farmers is 0.25 which is way too low and shows high level of deprivations in their livelihood. Major factors limiting the production of the crops includes Potato Blight Disease (100.0%), Poor Pricing (95.0%) and Limited Access to Extension Agents (90.8%). In conclusion, production of Irish potato is profitable with a low profit margin and its producers are living within a low livelihood level. Recommendations proffered include the need for training farmers on group formation and need for funding research organizations to operate in their fullest capacities.

Keywords: Profitability, Livelihood, Irish Potato, Farmers

JEL Codes: I31, C67 and C43

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INTRODUCTION

Potato (*Solanum tuberosum*) is a tuber crop, it has been an important commodity to farmers, traders, and consumers. It is 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.

The Food and Agriculture Organization Corporate Statistical Database (2021) reported that about 7.2% of the global potato production was attributed to Africa, while Europe and Asia contributed approximately 80.2% (Europe 29% and Asia 51.2%). Africa is among the continent with lowest contribution to global production of potato tubers, with Oceania being the lowest.

According to FAO (2007), Nigeria is ranked the 7th in Africa in terms of potato production with 270,000ha of land cultivated annually yielding a total of 843,000 tonnes of potato with an average yield of 3.1 tonnes/ha. About 95% of the total potato produced in Nigeria comes from Plateau State, the climate in the state is suitable for growing the crop. Other potato growing areas that account for the remaining 5% are Obudu highlands in Cross River State, Mambila Plateau in Taraba State and Biu Plateau in Borno State (NRCRI, 2015).

Nigerian agricultural sector has continued to make modest contribution to the provision of food and livelihood to majority of the populace despite the overarching influence of oil sector on overall national income generation (World Bank, FAO, NRI. 2011). Irish potato is a major root crop in Nigeria, essentially produced under the rainfall condition or in fadama (swampy area) in the dry season (Emmanuel, *et,al* 2016). And with several other arable crop such as legumes, cereals, roots and tubers, which are important toward achieving food sufficiency and improving people standard of living (Dimlong, 2012). Irish potato is by far the most efficient tuber crop

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in terms of yields and many of the producers of the crop in Nigeria are peasant farmers who cultivate less than one hectare with low productivity and yields (Yusuf, and Wuyah, (2015). Nigeria's production level has been on the increase with yield per hectare of 3,720.1 kg/ha and understanding the functioning of input and output marketing is essential to the improvement of farm yield and productivity of smallholders' agricultural producers (FAOSTAT, 2019).

Irish Potato marketing has rapidly expanded over time and the growing domestic market presents a valuable opportunity for the smallholder Irish potato farmers and provide a path out of subsistence farming (Danso-Abbeam, *et,al* 2015).

Unarguably, profit maximization forms an integral part of any agricultural venture, and is important and desirable to every farmer, as it will not only improve their income and livelihood but would also influence the farmers' adoption of new technologies. However, effort to complement literature on estimation of costs and returns in potato production investment become imperative for agricultural producers; especially for Jos South Local Government**,** Irish potato producers in terms value of yield and cost of production they incurred. Hence, the main objective of the study is to determine small-scale Irish potato farmer's profitability, their livelihood status and constraints hindering the production.

LITERATURE REVIEW

WHAT IS LIVELIHOOD:

The term livelihood is often used synonymously with economic strengthening and refers generally to economic production, employment, and household income. A more holistic understanding of livelihood, however, incorporates this general definition within a broader context of economic development, reduced vulnerability, and environmental sustainability. The work of Chambers and Conway in the early 1990s built on participatory research practices and ideas put forward by the World Commission on Environment and Development. They

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developed a definition of livelihoods and the factors that make them sustainable which underpins all of the livelihoods frameworks currently being used: A livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living: a livelihood is sustainable which can cope with and recover from stress and shocks, maintain and enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels in the long and short term (Chambers and Conway, 1991).

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MEASUREMENT OF LIVELIHOOD STATUS

1. **The Household Livelihood Security Assessment (HLSA)**: This is also referred to as the CARE approach of livelihood measurement. The idea of measuring well-being at the household level is not a new concept. Belcher (1951) began developing scales for measuring levels of living at the household level. In the last two decades, the frameworks for household livelihood security have been explored and developed in a variety of institutions like the International Food Policy Research Institute (IFPRI) and in many departments of applied anthropology (Drinkwater, 1994; Franken Berger, 1992, 1996; Maxwell, 1994). In the last decade, Franken Berger and others have effectively adapted them as useful programming tools for not-for-profit relief and development organisations (CARE East Africa, 1996; CARE Kenya, 1996a, b; CARE Sri Lanka, 1997; CARE India, 1997). By 2000, CARE has conducted 50 HHLS studies in 40 countries. A wide range of approaches has been even further refined during 1997–2001 (Franken Berger, 2000) within the overall wide range of approaches to household livelihood assessment, specific HHLS index work at CARE was piloted in Kenya, India, and Sri Lanka.

   The HLSA index helps to provide an even clearer profile of the constraints to family or community livelihood security. The household livelihood security index is an eight-component measure focused directly on the constraints to family and community well-being in middle- and lower-income developing countries. It helps to identify intra-household economic and social dynamics and the coping mechanisms families use to combat poverty and scarcity. It is one element of a participatory community-based rapid poverty assessment and program tool which colleagues at CARE have developed. It uses about eight hours of ‘‘on the ground’’ survey team assessment time to help produce a community baseline photo of the constraints to household livelihood security. It

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allows the team and the community to use the photo help ensure a focused discussion to connect community status, symptoms and causes of livelihood security problems and specific poverty alleviation programs. Unlike other national measures, its primary purpose is for community-based rapid assessment which can guide development program design. It is not a highly sensitive researcher's tool to be used for national cross comparisons. Nor is it meant to be. The index ranges are adjusted for each country or sub-national situation with the help of national and local academics, government and NGO staff and community members.

1.1.Development of the HLSA-Index

The eight components of livelihood security include income and assets, food and nutrition, education, participation, water, sanitation, primary health, and reproductive health. Each of these elements is ranked for availability, accessibility, quality and status on a five-point ordinal scale whose ranges are pre-calibrated by CARE staff, local and national academics, and government and NGO workers. Each of the components can be shown separately and an aggregate measure of livelihood security can be displayed. The aggregate measure is based on an equal weight of each of the eight subcomponents. The subcomponents are grouped into five household livelihood security areas: economic security, food security, health security, educational security and empowerment. Food, health, and educational security are separate composite measures of the availability, accessibility, quality and impact of these elements of household livelihood security. Health security, for example, includes measures of water, sanitation, primary health care and reproductive health delivery constraints. Economic security is measured through questionnaires that establish annual income and asset levels for a sample of households. Participation and empowerment include measures of community participation and the density of civic organisations. The HHLS framework is quite simple and not too abstract for practitioners to adopt, this can be

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supported by how it has been adopted by many organisations as a means of measuring livelihood. As adopted by Linden Berg, (2002) in his studies he preferred the use of the HHLS framework as a result of its simplicity and straightforwardness, unlike other national measures whose primary purpose is for community-based rapid assessment which can guide development program design. It is not a highly sensitive researcher's tool to be used for national cross comparisons. Its compatibility and simplicity in achieving the livelihood outcome form the basis for its adoption to this study.

METHODOLOGY

STUDY AREA

Jos South Local Government Area (LGA) is located in Plateau State in the North Central geopolitical zone of Nigeria. It lies between latitude 9°48′00″ North and Longitudes 8°52′00″ East. The LGA has a land area of 5104km^2 with population of 306,716 as at the 2006 national census. The estimated population of the study area as at 2020 using the 2.6% annual groath rate stood at 418,361. The region is about 1230m above sea level, with about 1400mm of annual rainfall which spans from April to October (NRCRI, 2015). The climate is characterised by two distinct seasons, the rainy season, and the dry season, which falls between November and March. High temperatures are recorded in the months of March – May while the lowest temperatures popularly called the Harmattan months are between December and January. These seasons are suitable for potato production because they meet the required 15^{0}C for tuber formation. Other crops produced in these areas include tomato, cabbage, carrots, lettuce, cucumber, green beans and onions. Cereal crops such as maize sorghum and millet are also grown in the area. Potato producing seasons were April – July (rainy season) and September – January (dry season). Over 80% of the potatoes are produced as a sole crop during the dry

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season and in mixtures during the rainy season. The climate of the State is ideal for Irish potato production as well as vegetables, fruits and other exotic crops.

SAMPLING PROCEDURE

Jos South was selected purposively because it is among the locations where Irish potato is cultivated and also safe for data collection without exposing the reseracher to frequent conflict in the terrain. From the local government area, four (4) communities namely Nding, Du, Kuru, Vwang and Gyel were randomly selected. From where thirty (30) farmers were systematically randomly selected from each of the sampled communities. The study in all interviewed 120 small-scale Irish potato farmers. Primary data was collected through the use of a structured questionnaire. Trained enumerators were hired for the conduct of the interview while the researcher supervised data collection process. This process made data collection much easier since the trained enumerators are able to communicate in their local dialect anything that proved not well understood by the respondents.

TOOLS OF ANALYSIS

i. Descriptive statistics through descriptive statistics tools such as frequencies and percentages were used to describe constraints hindering Irish potato production.

ii. Gross Margin Analysis: This model was used to achieve objective on profitability and can be explicitly written as:

$GM = GR - TVC$

Where;

GM = Gross Margin (₦/Ha)

GR = Gross Revenue (Gross Sales) = Total output (kg/ha) x Unit Price (₦/Kg)

TVC = Total Variable Cost (sum total of all costs of buying variable items such as seeds, fertilizer, agrochemicals, labour etc.)

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Note: TVC for the farmers is the sum of all cost for using variable inputs such as seeds (kg), agrochemicals (litre/kg), labour (man-hours), organic manure (kg) etc. All these shall be multiplied by the unit price of the respective inputs used.

Other ratios used are;

Gross Ratio: This is given by;

$$G.R = \frac{TVC}{GI}$$

Where;

G. R = Gross ratio

TVC = Total variable cost (Cost of all recurrent inputs such as seed, fertiliser, labour, crop management costs)

GI = Gross Income (Income from the sales of farm outputs). It is given by;

GI = Total Irish Potato Output (kg) x Price per unit of Potato (₦/kg)

It shows the proportion of the gross income that goes to pay for the operating costs.

Return on Capital Investment: This is the amount that every capital (Naira) invested will pay back after been committed in a production or business cycle. It is given as;

$$ROI = \frac{GI}{TVC}$$

Where;

ROI = Returns on investment

GI = Gross Income (₦)

TVC = Total Variable Cost (₦)

This shows the returning efficiency of every naira invested and they altogether determine the whether a farmer remains or is removed out of business.

iii. Household Livelihood Security Assessment Framework (HLSA): The HLSA framework was used to determine the livelihood status of Irish potato farmers. The

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framework has five livelihood indicators namely: Economic security, food security, health security, educational security and empowerment. These were later developed into sub-indicators which aide in designing questions to address the livelihood components of the research tool.

The Patnaik and Narayanan (2005) approach of index construction was adopted. It first involves computing the averages of individual livelihood component and later a more aggregated value is computed for the whole components.

The complete stages for constructing the livelihood index using the Patnaik approach is as follows;

a. Selection of study area
b. Choosing of any livelihood development framework and its indicators (HLSA livelihood Components: economic security, food security, health security, educational security and empowerment)
c. Data collection and arrangement
d. Data Normalization/Standardization: The UNDP's human development index (HDI) (UNDP, 2006) is used to normalise and/or standardise the data set, where the kind of functional relationship existing between livelihood and the indicators are measured. It is also regarded as a stage where standardization of the indicators is made since they have different scales and the kind of effect the indicator has on the concept is ascertained. Two functional relationships exist, the positive and negative relationship. The former adds to livelihood standard while the latter decreases livelihood standard. For a j^{th} indicator on i^{th} farmer, to deduct for a positive relationship the function below is used;

$$X_{ij} = \frac{X_{ij} - min\{X_{ij}\}}{max\{X_{ij}\} - min\{X_{ij}\}}$$

For a negative relationship, the function below is utilised;

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$$Y_{ij} = \frac{max\{X_{ij}\} - X_{ij}}{max\{X_{ij}\} - min\{X_{ij}\}}$$

After they are normalised, the value lies between 0 and 1. For a farmer having a value equals to 1 or more closer to 1, that farmer is regarded as a farmer with good livelihood standard and otherwise for a farmer having a lesser or 0 values.

e. After the relationship for all the indicators is computed, a sum of all indicators for a single livelihood parameter is done. It is achieved in the order below;

Let assume Economic security to have its indicators as X_1, X_2, X_3, X_4, and X_5 respectively. The mean for Economic security component will be given by;

$$Mean\ for\ E.S = \frac{X_1 + X_2 + X_3 + X_4 + X_5}{n}$$

Where;

$E.S$ = Economic Security Livelihood component

$X_1 to\ X_5$ = Economic Security indicators

n = Total number of Indicators

The method is done for all the HLSA livelihood components to get the;

$\overline{E.S}, \overline{F.S}, \overline{H.S}, \overline{Ed}, and\ \overline{Em}$

Where;

$\overline{E.S}$ =Mean for Economic Security Component (sub-indicators such as income, assets etc.)

$\overline{F.S}$ =Mean of Food Security Component (sub-indicators on food consumption, food in store, span on food across the year, resilience on food insecurity)

$\overline{H.S}$ =Mean of Health Security Component (Availability, condition and staff disposition of health facilities)

$\overline{Ed}$ =Mean of Educational Security Component (Availability, condition and staff disposition of educational facilities)

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$\overline{Em}$ = Mean of Empowerment Component (Membership of association, NGOs, projects and the benefits obtained)

f. Finally, a weighted mean for the whole livelihood sub-components is computed and that is the livelihood index.

$L.I = Average\ (\overline{E.S}, \overline{F.S}, \overline{H.S}, \overline{Ed}, and\ \overline{Em})$

RESULTS AND DISCUSSION

COSTS AND RETURNS ANALYSIS OF IRISH POTATO FARMERS

This component computes all the cost implications and the total revenue from Irish potato production per hectare. The information gathered were used for determining the profit situation of Irish potato production in the study area.

Table 1 shows that the Irish potato farmers in Jos South LGA had over 31.84% of their total cost spent on labour, 29.09% on seed procurement, 14.68% on fertilizer purchase, 11.40% spent on purchase of agrochemicals, 7% as transportation costs, 5% spent on purchase of organic manure and 0.96% for bag costs. A mean output of 621kg was realized per hectare valued at ₦142,209 and a Gross Margin of ₦13, 633 per hectare. In addition, the returns on every naira invested is 1.11 and a gross ratio of 0.90. The result on profitability implies that Irish potato production in the study area was a profitable enterprise, however effect of high input cost was seen to affect the farmers profit margin and thus agrees with the findings of Jwanya (2014), Ayodele (2005) and Catherine (2008) they both reported Irish potato as a profitable venture and also reported that cost of seeds, labour and fertilizers are those variable items where more money is expended in Irish potato production and hence are the most demanding variable items for Irish potato production.

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Table 1: Costs and Return Analysis of Irish Potato Production

Variable Inputs	₦/Ha	%
Seeds (₦/Ha)	37,407	29.09
Fertilizer (₦/Ha)	18,872	14.68
Organic fertilizer (₦/Ha)	6,465	5.03
Agrochemicals (₦/Ha)	14,664	11.40
Labour (₦/Ha)	40,934	31.84
Transportation Costs (₦/Ha)	8,994	7.00
Cost of bags (₦/Ha)	1,240	0.96
Total output (kg/Ha)	621	
Unit Price/kg (₦/kg)	229	
Gross Income (₦/Ha)	142,209	
Total Costs (₦/Ha)	128,576	
Gross Margin (₦/Ha)	13,633	
Returns on Investment	1.11	
Operating Ratio	0.90	

Field Survey, 2017

LIVELIHOOD STATUS OF IRISH POTATO FARMERS

This section described Irish potato farmers according to their livelihood status as estimated and it ranges between 0-1. For an Irish potato farmer having a number closer to 1, that farmer is said to be having good living standard and otherwise for a farmer with livelihood closer to 0.

Table 2: Livelihood Status of Irish Potato Farmers

Class Interval	Freq.	Percent
0.01-0.20	27	22.5
0.21-0.40	52	43.3
0.41-0.60	16	13.3
0.61-0.80	23	19.2
0.81-1.00	2	1.7
Minimum	0.09	
Maximum	0.84	
Mean	0.25	

The mean livelihood of Irish potato farmers in the study area is 0.25 which is way too low and thus implies majority of farmers are living on a poor wellbeing scale. Table 2 showed that 43.3% of Irish potato farmers operate between livelihood scale of 0.21-0.40, followed by the 0.01-0.20 class with 22.5% and the least (1.7%) is to the 0.81-1.00 livelihood scale. The description therefore implies that Irish potato farmers in the study area belongs to low

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livelihood class which is characterized by insufficient basic amenities and even if available in a poor condition, resourced-poor farming families, only few family assets and vulnerable to lots of atmospheric and climate change parameters such inadequate rainfall, pest and diseases, high cost of inputs etc. These altogether makes it difficult for them to provide the required inputs needed for cultivation of the crop, hence making it difficult to get good profit margins.

FARMERS CONSTRAINTS

Constraints are any form of abnormalities which are capable of and can be able to decrease the quantity of output expected by a farmer. It can either be due to reasons such as neglect or lack of experience/exposure regarding the production of the produce or it can be from natural means such as disease, flood, change in climate among others.

Table 3: Constraints Faced by Irish Potato Farmers

Constraints	Freq.	%
Potato Blight Disease	120	100.00
Poor Pricing	114	95.00
Poor Infrastructures	67	55.83
Inadequate Credit Facility	43	35.83
Limited Access to Extension Agents	109	90.83
High cost of inputs	90	75.00

Multiple Response

The major constraints that limit Irish potato production Potato blight disease (100%), Poor pricing (95%) and Limited access to extension agents (90%). It implies that Irish potato farmers The study agrees to the findings of Jane (2013) that reported Price fluctuations, poor infrastructures and diseases as the most prominent constraints limiting Irish potato production in Kenya, the difference could probably be as a result of differences in the study sites.

CONCLUSION/RECOMMENDATION

Irish potato production is profitable enterprise, however problems associated with poor marketing system, pest and diseases continue to drag farmers backward and prevent them from growing the enterprise. These challenges among others have as well affected the livelihood

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status of the farming households in the study area thus making a significant proportion living within a livelihood scale of 0.21-0.40. The study therefore recommends;

i. Farmers should be trained on group formation processes and the importance attached to it. They should be made aware on how to go about group procurement of inputs and group marketing process and the benefit they could get from so doing. This has proved to be an effective mechanism of reducing input cost and ensuring its quality, since they will buy from reliable marketers/producers in group and that tends to be very effective tool of reducing variable costs of farmers and can also make them engage in group marketing of their produce thus improving their profit margin.

ii. Researches should be conducted to proffer a cure to Irish potato diseases and pests by institutions with mandate on the crop particularly on Irish Potato blight (100%), since it has claimed to be an important crop disease that threatens farmers output.

iii. Programmes that could enhance cost reduction on production inputs should be embark upon by government and agencies concern.

iv. The federal government and the insurance organization in Nigeria should come up with an effective insurance package for the Irish potato producers in an event of risk occurrence (Blight infestation).

v. Stakeholders in the commodity's value chain should devise a means of improving farmers access to basic infrastructures such as access to good education, health and other livelihood determinants. Doing so will help in improving farmers living standard and will also reduce the rate of rural-urban migration which has swept away many youths that would have done better in the rural communities.

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