

IMPACT OF IRISH POTATO GROWING TO THE LIVELIHOOD OF FARMERS

ACASE STUDY BUHARA SUB COUNTY KABALE DISTRICT

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ABSTRACT

The study aimed at the impact of Irish potato growing to the livelihood of farmers and it was guided by the following objectives; To develop an educational program for the indigenous and poor small holders in Buhara sub county to introduce good agricultural and post-harvest practice s including sustainable agriculture, to identify the most t problems facing Irish potato growers in Buhara sub county and to find out the factors that influence Irish potato growing in Buhara sub county kabale district. This study was specifically be conducted among community members who was selected from the four main villages of Buhara Sub County and other important respondents who was selected from other parts of kabale district. Ordinary least squares productivity function's restricted logarithm-likelihood function's value under the null hypothesis (H_0) is -50.32, while the unpredictable Cobb-Douglas function's unrestricted log probability function's value under the alternative hypothesis (H_1) is -46.759. This indicated that $LR = -2(-50.32+46.759) = 7.122$ was the generalized likelihood-ratio (LR) statistic for assessing the lack of a technological inefficiency effect from the frontier. This value was more than the 5% level of significance's crucial 1) (5%, 2 value of 3.84. Producers ought to be given access to trustworthy markets where they may sell their potatoes at competitive prices. It is crucial to construct effective value chains, enhance market connections, and forge alliances with buyers, processing units, and retailers. Farmers may be able to bargain for more advantageous agreements, get better rates, and have access to market data and possibilities.*

Key words: *post-harvest, farmers, Irish potato growing and productivity.*

Background of the study

Irish potatoes are a food crop product that offers a wealth of chances for investment to increase value. In terms of yields of consumable energy and high-quality protein, it is one among the world's most productive food crops (Burton, 2019). Irish potatoes are regarded as a nutrient-dense primary plant food with a harmonious protein-to-calorie ratio, significant levels of vitamins, particularly vitamin C, minerals, and trace elements (Emana and Nigussie 2016). Irish potatoes are sold in five distinct product categories on the global market: seed Irish Potato, ware Irish Potato, frozen chips, crisps/snacks, and various ancillary goods like starch (Grace et al., 2023). The list's marketplaces for frozen chips and snacks saw the fastest worldwide expansion (Ferris et al., 2001). As a result, both of the products designated (frozen nibbles and chips) account for the majority of value addition in the Irish Potato business. 70% of the Irish potatoes sold in worldwide, including raw tubers and products like chips and flour, are exported by nations like Holland that have been profitable in growing their Irish potato industries (Kato, 2015). Under the condition that the good's quality is comparable with imports (Ferris et al., 2001), Uganda has the capacity to manufacture and serve its domestic market with crisps and snacks (Oscar et al., 2023). They are haphazardly developed on the slopes of Mubende and Mityana in the central area.

Based on prolonged productive assessments using FAO (2014) data, it can be seen that Uganda's Irish Potato yields are relatively low at 7.14 metric tons per hectare compared to those of other nations like Rwanda (14.2 tons), Kenya (20.3), China (15.8), and India (23.7 tons). The profitability gap at the manufacturing level of the earnings chain suggests that there is still an opportunity to boost Uganda's Irish Potato output, which would help offset the latent loss in Irish Potato overall revenue. The yield gap presents both a problem and a financing possibility for boosting the Irish Potato subsector's overall value in terms of agricultural GDP(Annet et al., 2023).

Statement of the problem

Their top priority in reducing impoverishment is food security, which is regrettably not being taken into account by the NAADS (Deniva, 2015), as the program's emphasis is on raising agricultural output but not ensuring adequate nutrition for every participant. Under the Plan for Modernity Agriculture, NAADS is a government initiative that was launched in 2001 with a mission to increase the agricultural sector's availability of knowledge for successful used for farming production and improve of food safeguarding for poor farmers (Kazaara & Christopher, 2023). Therefore, it is imperative to address all aspects of Irish farmers. Therefore, as advised by the Ugandan government through Naads developers, a large portion of the population in Kabale Kisoalo District does not have access to adequate food to sustain them. As a result of the knowledge provided above, the investigator hopes to determine how Irish potato farming affects the financial security of landowners in Buhara. Farmers in Buhara should always have financial, social, and physical access to enough food that is secure and wholesome and satisfies their food preferences and dietary requirements in order to live an active and healthy life.

Specific Objectives

- 1. To develop an educational program for the indigenous and poor small holders in Buhara sub county to introduce good agricultural and post-harvest practice s including sustainable agriculture*
- 2. To identify the most t problems facing Irish potato growers in Buhara sub county*
- 3. To find out the factors that influence Irish potato growing in Buhara sub county kabale district*

Research questions

- 1. How can movement develop an educational program for the indigenous and poor small holders in Buhara sub county kabale district to introduce good agricultural and post-harvest practices, including sustainable agriculture practices*

2. *What constraints faced by farmers during Irish potato growing in Buhara sub county kabale District*
3. *What are the factors that influence Irish potato growing in Buhara Sub County kabale district*

Methodology

Research design

*Although non-experimental, the investigation was both qualitative and quantitative. The study area (Buhara Sub County) underwent random sampling, and the following characteristics were obtained, including individuals who, variables which encourage Irish potato growing, limits on Irish potato growing kinds grown, and people who. The actual findings were obtained by comparing the outcomes. **Study population Study population***

This study was specifically be conducted among community members who was selected from the four main villages of Buhara Sub County and other important respondents who was selected from other parts of kabale district. The study sample includes the category of people to whom data was collected from, their sex, experience and the number of people (respondents) was interviewed. This was done as illustrated in the table 1 below;

Table 1 showing study Population samples

Category	Population	Sample size	Techniques
District officer	1	05	Random
Extension workers	10	02	Random
Contact farmers	40	15	Purposive
Farmers	50	10	Radom

Data collection methods

Data was gathered through the use of surveys, interviewing protocols, and observation. Simple random sampling was utilized in the study to choose participants from the population.

Each member of the strata had an equal probability of being selected for the sample using this methodology. Lists of the authorities at various administrative levels are gathered, and participants voluntarily take part in the survey. In terms of inhabitants, the searcher selects a sample from each proportion of participants, assigning a number to each person in the population at hand, placing the amounts in a packaging, then selecting a number at random and sitting down. The individuals that match the pick's numbers are comprised of the collection.

Sampling Technique

Due to a lack of time and finances, sampling is the choice of a percentage from the greatest population whose opinions have been extrapolated to represent the opinions of the target group (Wilson 2010).

Purposive or judgmental sampling was employed by the investigator. With the purposeful sampling method, respondents are carefully chosen because they are knowledgeable about the study and will provide accurate data. The reason why the sampling technique was used by the investigator because, according to 1991, it produced dependable data from reliable sources.

Data analysis

The researcher analyzed data using SPSS (Nelson et al., 2022). This is the process of identifying patterns or themes within the data collected qualitatively. The commonest ideas from the respondents made up themes which helped to have a detailed understanding about the topic understudy

RESULTS

Characteristics of Irish Potato Production System

Table 1 presents a summary statistic of the socio-economic characteristics of the farm households. The mean age of the household heads in the sample was 47 years old with 10.64 years standard deviation. The minimum age of the household heads was 26 years and the maximum was 70.

Table 1: Socio-economic Characteristics of Irish Potato Producers

Characteristic	Unit	Mean	Std. Dev	Min.	Max.
Age of household head	Years	47.06	10.643	26	70
Education level	Years	9.59	3.003	0	18
Experience of producer	Years	14.13	8.232	2	35
Contact with extension	No. of visits	1.09	1.362	0	6
Family size	Persons	4.82	1.706	1	10
Farm size (acres)	Hectares	2.46	3.057	0.51	24.49

Source: Computed from Field Survey Data

The household head had an average education (years of formal schooling) of 9 years, ranging from 0 to 18 years. The average number of years spent in school indicates that sample farmers often only complete high school.

The amount of years the family head had spent cultivating Irish potatoes served as a proxy for competence. The median amount of experience was 14 years, with 35 being the highest and 2 being the lowest. The dissemination of technology was likely limited by the average one visit by extension staff made to each sample farm home in 2007, as shown in Table 1. Between 0 and 6 extension representatives visited the farm homes that were reported.

The average family size, which is the sum of all occupants who had lived in the home for at least 12 months prior to the interview, was 5, with a range of 1 to 10. The size of the farms varied from 0.51 to 24.49 hectares. The findings indicate that the standard

deviation for farm size was 3.057 hectares, while the average farm size was 2.46 hectares. Land use per person has decreased as the population has grown, necessitating an improvement in agricultural efficiency and productivity.

Table 2 lists the features of the sample Irish potato growers in terms of gender, access to financing, and participation in a farmer's association. Of the 127 randomly chosen families, 38 (30%) had female heads of the family whereas 89 (70%) had male heads.

Characteristic	Number of farmers	Percent of farmers
Gender of household head		
Male	38	30
Female	89	70
Received credit		
Yes	44	35
No	83	65
Member in farmers' association		
Yes	53	42
No	74	58

Source: Computed from Field Survey Data

Only 35% of the household samples used credit on average, which suggests that there are little options to get credit in the study area. Only 53 (42%) of the farmers belonged to a farmers' organization, while 74 (58%) of them did not. Irish potato farmers noted that access to research facilities, mutual support, and in certain cases loans were all advantages of membership in a farmers' organization.

The frequency breakdown of the household heads' ages, levels of education, and years of employment is shown in Table 2. 33.1% of the people who participated were among the ages of 36 and 45, 29.1% were among the ages of 46 and 55, and just 23.6% were over the age of 55.

The household head's education degree is a significant factor that is likely to have a beneficial impact on efficiency. Regarding the educational level of the household head,

87 (68.5%) had between 8 and 14 years of supervised schooling, 34 (26.8%) had between 1 and 7, and 5 (3.9%) had more than 15 years of formal education. As a result, the majority of the family heads had completed their secondary education.

Irish potatoes had been grown in more than half of survey families (65.3%) for more than ten years, while just 34.6% had done so for less time. One macroeconomic factor, knowledge, was expected to have a positive impact on farmers' output efficiency through educational experiences.

Table 3 presents results of sample Irish potato producers' contact with extension workers by division. Of the sample households, on average, only 49.8 % were visited by extension workers which imply that the majority of the farmers (50. 2%) had no contact with extension agents.

Division	Mean number of visits per year	Percentage of farmers receiving extension
Ndaragwa	1.27	57.5
Ol joro orok	0.98	45.5
Ol kalou	1.02	46.5
Mean	1.09	49.8

Source: Computed from Field Survey Data

Table 3 lists the different forms of credit used by the sample farmers. Potato farmers in Ireland have limited access to credit. The majority of those who received credit did so from family members or friends (48.8% of credit sources), while rotating credit and savings clubs (ROSCAS) represented 34.1% of credit sources. Other sources included input merchants (3.8%), savings and credit societies (10.5%), and others (2.8%). We can infer that the main source of legitimacy for those who accessed was unofficial sources. This can be as a result of how simple it is to obtain credit from these sources with low charges for

transactions and no need for collateral.

Source of credit	Percentage of farmers receiving credit
Savings and credit societies (SACCO)	10.5
Relatives and friends	48.8
Rotating savings and credit associations (ROSCAS)	34.1
Input traders	3.8
Others	2.8

Source: Computed from Field Survey Data

Table 4 provides a summary statistic of the variables that are defined in the empirical model of the manufacturing function. Growers harvested an average of 97.55 bags of Irish potatoes per hectare, with a standard deviation of 39.16 bags. Irish potato yields, which ranged from 62.05 to 185 bags/ha, were incredibly inconsistent. The difference in yield between the standard deviation and the lowest and highest yields was 35.5 bags and 87.45 bags/ha, respectively. These findings imply that there is significant room for raising average Irish potato yields in the research region.

With a range of roughly 0.082 to 1.22 hectares, the mean plot size among the investigated farms was 0.34 hectares.

Variable	Unit	Mean	Std. Dev	Min.	Max.
Output	Bags ^a /ha	97.55	39.16	62.05	185
Plot size	Hectares	0.34	0.215	0.082	1.22
Labour	Man-days/ha	154.19	53.90	95.08	345.45
Seed	Kgs/ha	1592.10	639.22	1326.67	2975.38
Fertilizer	Kgs/ha	238.12	145.34	0	653.33
Fungicide	Grams/ha	1377.86	1441.93	0	4900

^a1 Bag = 110 kg

Source: Computed from Field Survey Data

An important factor that could significantly affect yield per hectare is the number of seed per hectare. The sample farmers' average seed planting rate per hectare in the study area was 1592.10 kg/ha, with variations between 1326.67 and 2975.38 kg/ha. The suggested amount of 1960 kg/ha (KARI, 1995) is less than this average amount of seed per hectare. This will have a detrimental effect on output and ultimately yield. An average of 154 man-days of labor were used per hectare, with variances of 95 to 345 man-days.

Due to the crop's high nutritional requirements, fertilizer is another significant factor and one of the essential inputs in the cultivation of Irish potatoes. Average fertilizer use was 238.12 kilograms per hectare. However, fertilizer application varied widely between nonapplication and 653 kgs/ha for the respondents.

Table 5 shows the frequency distribution of sample households growing the different varieties of Irish potatoes.

Variety	Frequency	Percent
Kerr's Pink	15	11.8
Tigoni	53	41.7
Nyayo	36	28.3
Asante	5	3.9
Tana	7	5.5
Other	11	8.7
Total	127	100.0

Source: Field survey data

Figure 1 shows the mean yields of the varieties planted by the sample households. Generally,

Tigoni 'variety had the highest mean yield of 115.75 bags per hectare and therefore appears more popular with farmers followed by Asante 'with a mean yield of 97.62 bags per hectare.

Despite the yield for Tigoni 'being the highest, perceived weaknesses of Tigoni' variety are poor storage, rapid greening of tubers and limited availability of planting materials (Walingo et al., 2002; Kabira, 2002).

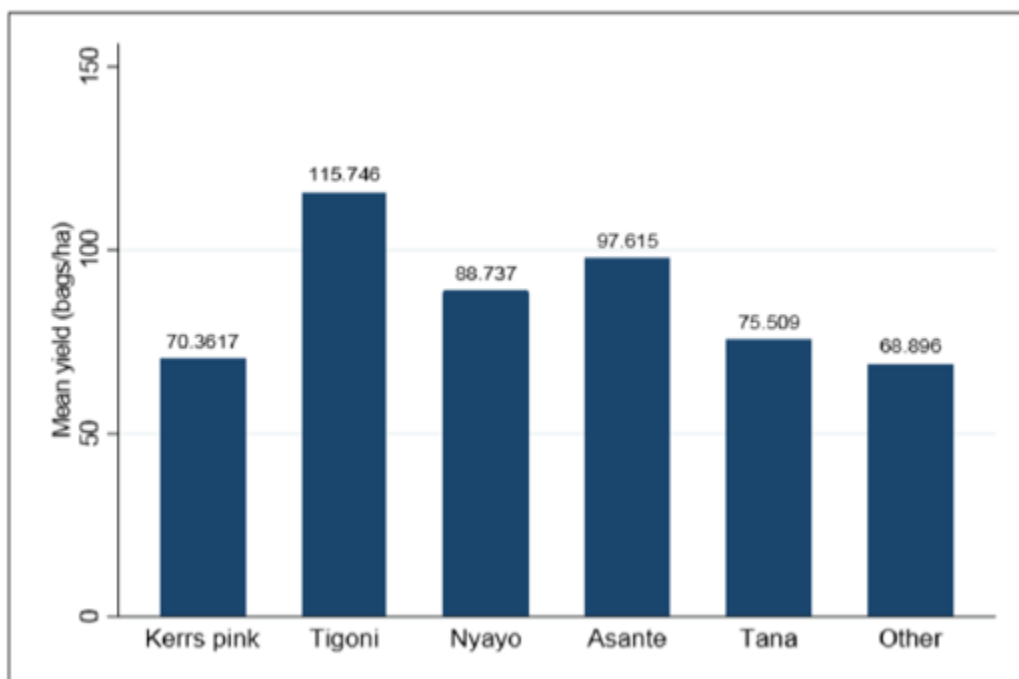


Figure 2: Mean Yield of Irish Potato Varieties Source: Computed from Field Survey Data

Stochastic Production Frontier Estimation Results for Irish Potato Production

Stochastic Production Frontier Estimates

Table 6 presents the results of the maximum likelihood (ML) estimates of Cobb-Douglas stochastic frontier production function. The maximum likelihood estimates of the parameters defined by equation (9) were obtained by using FRONTIER 6 (Coelli, 1996) computer programme. Ordinary least squares (OLS) production function estimation results are presented for comparison purposes.

Variables	Stochastic frontier (ML) estimates		Ordinary least squares (OLS) estimates	
	Coefficient	p-value ¹	Coefficient	p-value
Intercept	1.506**	0.016	0.639	0.394
Ln(Plot size)	0.373***	0.004	0.260*	0.077
Ln(Labour)	0.205**	0.033	0.241**	0.021
Ln(Seed)	0.175**	0.042	0.216*	0.057
Ln(Fertilizer)	0.071***	0.002	0.082***	0.002
Ln(Fungicide)	0.031***	0.003	0.033***	0.006
Function coefficient	0.855		0.832	
F statistic model			55.80	
F-statistic CRTS			7.287	

Results on the dynamics of the error term described in equation 9 are presented by the sigma-squared, gamma, and log probability parameters displayed in Tables 6. These variables are used in statistical tests to determine whether the model's effects on inefficiency and its suitability as a data representation tool. The ratio of the inexplicable inefficient error term (2) to the overall sum of errors, that is, is what is referred to as the gamma () parameter. $\sigma^2 / (\sigma^2 + \mu^2 + \nu^2)$ The model's inefficient impacts were tested using the gamma () variable. The gamma () function examines the systematicity or randomness of the observed changes in effectiveness. The γ -parameter, or $(\sigma^2 / (\sigma^2 + \mu^2 + \nu^2))$ from the frontier, quantifies the impact of technical inadequacy on the total variability of observable output.

The variance parameter's estimated value was close to one (0.85). One-sided error (inefficiency) substantially predominates the overall variation, as shown by the variance, σ^2 , linked with the inefficient impact, which accounts for nearly 85% of the total variance. This suggests that the amount and variety of Irish potato manufacturers' output are significantly influenced by the effects of inefficient. than determine if the production

function generated by the stochastic frontier was superior than the regular least squares model, the generalized log-likelihood ratio (LR) statistic, which is determined by equation (12), was used.

Ordinary least squares productivity function's restricted logarithm-likelihood function's value under the null hypothesis (H_0) is -50.32, while the unpredictable Cobb-Douglas function's unrestricted log probability function's value under the alternative hypothesis (H_1) is -46.759. This indicates that $LR = -2(-50.32+46.759) = 7.122$ is the generalized likelihood-ratio (LR) statistic for assessing the lack of a technological inefficiency effect from the frontier. This value is more than the 5% level of significance's crucial 1) (5%, 2 value of 3.84. As a result, the null assumption was rejected, showing that, given the matching ordinary least squares production function, the production function generated by the stochastic frontier provided an adequate summary of the data. The maximum-likelihood parameter estimates of the model show that all the parameter estimates have expected positive signs and are statistically significant in the frontier model. Plot size, fertilizer and fungicide were statistically significant at the 1% level while labour and seed are statistically significant at 5% level (Table 6).*

Conclusions

According to the study's findings, the farms that were included could maintain their level of manufacturing by using only a portion of the inputs that are currently used. The predicted average levels of technical, allocative, and financial effectiveness are 66.7%, 57.3%, and 39.1%, correspondingly. These findings show that farming procedures for the sample of Irish potato producers under consideration are very inefficient. By just increasing technological effectiveness, farms could lower their inputs by roughly 28% without reducing their production; by using inputs in the best proportions, or by increasing allocative efficiency; and by increasing economic effectiveness, they might decrease their inputs by 42%. Consequently, increased efficiency may favorably impact the farms' ability

to reduce manufacturing expenses and enhance their profit margin. There would be less expense.

Recommendation

Producers ought to be given access to trustworthy markets where they may sell their potatoes at competitive prices. It is crucial to construct effective value chains, enhance market connections, and forge alliances with buyers, processing units, and retailers. Farmers may be able to bargain for more advantageous agreements, get better rates, and have access to market data and possibilities.

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