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Investigate the Effects of Production and Profitability of Smallholder Potato Farmers: A Case Study of Kalombo Ward, Chavuma Constituency in Chavuma District of North-Western Province of Zambia

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Abstract

The main reason of this study was to investigate the production and profitability of Irish potato smallholder farmers' performance in Kalombo ward, Chavuma constituency in Chavuma District. The study aimed at determining economic profitability of Irish potatoes grown by small-scale farmers; identify existing Irish potato marketing channels and the role played by the key market participants and to examine the pricing structure of Irish potato farmers at different levels of market chain with a view towards establishing margins at different levels of market channels.

The study used a cross sectional survey in which data was collected at a single point at a time. A total of 120 respondents were organized and interviewed for this study

being 90 farmers and 30 traders. The research showed that the economic profitability of Irish potatoes was negatively affected by two sets of barriers; production and marketing challenges.

On the production part, challenges such as lack of high yielding cultivars, insufficient seed tubers, diseases, storage problems, low market prices, soil degradation and lack of agrochemicals were the main challenge in Chavuma District. Another constraints were observed from the marketing of Irish potatoes in the study area were the main bottlenecks as mentioned by farmers' especially unreliable market, uncertain prices, poor infrastructures, fewer buyers, and improper measurements.

Keywords: Producers, Processors, Wholesalers, Retailers, Farmers, Marketing, Middle Brokers, Traders, Transporters and Irish Potatoes Vines

Introduction

Background

Irish potato (*Solanum tuberosum* L.) is the fourth world's largest food producers after wheat, rice and maize. World production reached a record of 320 million tonnes in 2007 and production in the developing countries has almost doubled since 1991, with a corresponding increase in consumption (Hoffler and Ochieng, 2008; FAO, 2008). Potatoes are important sources of food, employment and income generation in the low and mid-income developing countries (FAO, 2008).

Potato plays a great role in the achievement of food security program due to its plasticity to environmental conditions and yielding capacities.

However, its productivity is far less than other countries due to constraints threatening subsistence farmers in Zambia. The demand for Irish potatoes continues to increase in conjunction with expanding diet diversity, requests for prepared food items, and a need for inexpensive foods. The ability to grow Irish potatoes in a wide range of climates and their adoption by a broad range of cultures has increased potato consumption worldwide.

Therefore, Irish potato is currently the predominant vegetable in terms of sales, production, and consumption. It is the most important crop in developing countries, and its production is expanding more rapidly than other food crops. As a result, it is becoming an increasingly important source of rural employment, income, and food for growing populations (MOA, 2005).

The Irish potato crop is produced mostly for local consumption and local markets in Ethiopia and Cameroon. It might be a very important crop in this region and accounting for per capita production values as low as zero in some cases. Its production in

Ethiopia, for example, is 0–45 kg per capita.

It is a crop that can be used to improve food security, create employment and generate income in Ethiopia and other countries in Africa and the rest of the world. Because it is high yielding ability in a short season, presence of suitable agro ecological zones within the country, the availability of labor for its production on large areas of land, and the accessibility of a potential market with considerable added value for its produce.

The Irish potato's high energy content and ease of production have also made it an important component of urban agriculture which provides jobs and food security to more than 800 million people globally (Hoffler and Ochieng, 2008).

Hundreds of millions of people in the developing countries including Kenya are facing food crisis as the cost of their staple foods continues rising. Rice prices have almost doubled during the year 2008, as wheat prices are increasing rapidly while maize prices are skyrocketing. But On the contrary, the price of potato has remained stable (Hoffler and Ochieng, 2008).

The potential of the Irish potato crop is yet to be fully realized and has never been more evident until the recent rising prices of rice, wheat and maize (FAO, 2008). The potatoes have the potential to relieve the pressure of increasing cereal prices on the poorest people and contribute significantly to food security.

Potatoes are grown and eaten locally, with little significant international trade compared to cereals, so they are particularly valuable as food in the developing countries. Irish potatoes mature in 3-4 months and can yield about 40 tons/ha (FAO, 2008) and hence ideally suited to places where land is limited and labor is abundant.

Kenya is the fifth biggest potato producer in Sub-Saharan Africa, with an output of 790,000 tons in 2006 (FAO 2008).

In Kenya, the crop is second most important staple food crop after maize (MOA, 2005) and plays a major role in national food and nutritional security (Maina and Chui, 1999).

Furthermore, the crop is an important food and cash crop in the medium and high rainfall areas (Kiiya *et al.*, 2006). In high and medium rainfall areas, it is grown by about 500,000 farmers, cultivating 108,000 ha with an annual production of over 1 million tons in two growing seasons (MOA, 2005).

It is also grown together with beans in the drier parts of the country during the short rains season when maize will normally do poorly (Kiiya *et al.*, 2006).

Potatoes are often eaten with beans in most poor rural households during the 'hunger period' just before the maize crop matures in the long rains season.

Irish potatoes were introduced to the area of contemporary Zambia most likely in the early twentieth century. In 1974, the government banned the importing of Irish potatoes (intended for consumption, rather than seed) and initiated a program of research and seed production aimed at self-sufficiency in both ware and seed potato production.

The program includes the Seed Potato Program of the Plant Introduction Center, the Zambia Seed Company, and the Zambia Seed Potato Producers Association (Mazalela, 1980; Chileshe, 1988 and 1982; Namasiku, 1984).

Potato production in Zambia is dominated by relatively few large commercial farmers. Although a few medium size

farms produce some potatoes, virtually none are grown by subsistence cultivators (Chileshe, 1988).

Farmers prepare land by plowing to a depth of at least 30 centimeters (cm), followed by ridging and earthing up. Potatoes are planted by hands in furrows made either by hands or with a ridging machine.

The sprouted seed tubers are laid on a thin layer of soil-covered fertilizer and covered with a layer of soil about 7-12 cm thick. Irrigation, if any, is applied immediately before and after planting. Soil amendments include green manure crops, especially legumes, and commercial fertilizers.

Weed control is generally achieved through cultivation rather than herbicides. Use of insecticides and fungicides is common. Yields are relatively high, ranging from 10 to 27 tons per hectare (Mazalela, 1980; Chileshe, 1988 and 1982).

Irish potatoes are an important food crop in Zambia, with production volumes only second to maize. Potatoes are produced in the cool highlands mostly by small scale farmers under rain-fed conditions. The soils in these areas are generally acidic and of low fertility due to anthropogenic activities. The national production is far below the potential, largely due to limited use of certified seeds, low application of fertilizers and other organic amendments, and low use of fungicides and other production chemicals. Marketing problems bedeviling potato industry include lack of organized channels in which farmers have no power. The channel is controlled by cartels, which shield producers from receiving any market information.

There is a lot of handling and in the process the producer's share in the final price of the commodity is very small. Transport of potatoes to the market is expensive due to poor road infrastructure in the producing area. Seasonality in production and lack of on-farm ware potato storage lead to minimal returns to farmers (MOA, 2005).

Problem Statement

Agricultural marketing plays fundamental role in the development process. Marketing process integrates the farming community into the national economy through communication and exchange. Agricultural marketing has a great potential in creating employment opportunities, increasing production and distribution of income by involving majority of people, reducing unemployment and fostering national food security (Matola, 2005).

Several studies have been conducted on the Irish potato production and marketing in Zambia. Some of which were Mussei *et al.* (2000) who studied the adoption of improved potato production technologies in Kalombo Ward, Chavuma Constituency in Chavuma district, Mwakasendo, *et al.* (2007) who assessed market for fresh and frozen potato chips in the ASARECA region and potential for regional trade the case study in Zambia.

Mayona (1991), assessed the potentials of Irish potato production and constraints in Kalombo ward Chavuma constituency in Chavuma District and Okoboi, (2001) who studied potato production and marketing in Tanzania and the market opportunities for Rwanda.

However, these studies had scanty information on the production and marketing performance. Therefore little is known about the general performance of the Irish potato marketing chain in Zambia and its contribution to a total household income, leave alone the specific problems that face the industry.

This study was therefore an attempt to fill that gap. Inadequate market information, especially on prices was the major obstacles to the performance of marketing and production system (Mlambiti, 1999).

The level of state intervention in other food markets such as fruits, vegetables, roots and tubers was less wide spread (Ponte, 2002).

General Objectives

The main objective of the study was to evaluate the Irish potatoes production and marketing performance in Chavuma district.

Limitations to the study

The majority of respondents in the study area do not keep records; this is fact that posed a big problem during data collection. Therefore, collection of the required information depended mainly on memory recall. On the other hand, some respondents particularly traders were reluctant to give data on income generated from their trading activities. However most of them were convinced to cooperate after being persuaded by market authority that the information so given was meant for research purpose and that their privacy would be respected.

Incapability to capture respondents at their place of work made it difficult to get their full attention/ cooperation especially traders due to their habit of moving here and there to find transport goods. However, this was taken as a challenge by researcher to familiarize with such research works. Convention of units was also a problem since some traders used local units like bags filled extra ordinarily and or heaps which are not standardized. Estimations had therefore been made to convert local units to conventional ones such as kilograms.

Justification

Market price fluctuation of potatoes indicated that farmers were not able to gauge the expected selling price of their produce and this translates to unstable farm incomes. The government has all along been trying to control the uncertainty and fluctuation through the Ministry of Agriculture but it has not been successful at all thus prompting our research in this area. The unstable and upward trend in the prices of farm inputs especially fertilizers has impacted negatively on the productivity of the crop and on potato farm gate prices and income stability to the farmers.

This research tried to determine possible ways of improving potato prices in order to encourage its production. The study results will help to explain the underlying interrelationship of potato production within Chavuma district so as to determine the farmer's problems to realizing profits in potato farming. The major determining variables available for the policy makers are the potatoes farm gate prices and the government intervention on the grading, packaging and marketing of the produce. The price of the competing crop (Maize) will be considered on how it impacts on the pricing of the potatoes.

Methodology

Research Design

The study used a cross sectional survey in which data was collected at a single point at a time. This design has been chosen because of its economic benefits to researcher in

terms of time and financial resource.

Data Collection and Sources

Primary Data

The primary data from the sampled farmers and traders were collected through formal survey by using a structured questionnaire. The questionnaire was pre-tested before the main survey to check the relevance of questions and to determine whether it was comprehensive enough to collect the required information. The information collected included household general characteristics, household source of income, and crop production including quantity produced, costs of production, labor and use of farm inputs. Other information was quantity of produce handled in various markets, buying and selling prices, marketing costs.

Secondary Data

Secondary data were collected from Chavuma rural district council offices and wards. Data from Chavuma rural district council were mainly on the social economic profile for the district and the Chavuma region at large. Information from the wards was on the number of the Irish potato farmers and traders their performance and the mode of the contract in the study area. More secondary data were obtained from relevant institutions and organizations like Chavuma region agricultural offices, National Agriculture Library (NAL) and internet.

Study Population and Sampling Procedure

The target population of the study was Irish potato producers and traders. Purposive multistage sampling technique was employed to select districts, divisions, wards and villages. Respondents were randomly selected from three villages. Random sampling procedure was used to reduce biasness due to large number of farmers in the study area.

Sample size

A total of 120 respondents were obtained and interviewed for this study being 90 farmers and 30 traders. Although sample size was limited to 120 it was sufficient enough to allow for statistical analysis. Usually the sample size depends on the size of the population to be sampled although general rule were hard to make without knowledge of specific population. Thirty cases seem to be minimal for studies in which statistical data analysis is to be done (Bailey, 1998). In this regard 30 farmers were selected from each village to make 90 farmers. At traders' level a total of 30 respondents were interviewed, among them being 8 wholesalers, 11 retailers and 11 transporters. The number was selected based on total number on traders available in the respective groups.

Tools for Data Analysis

The data obtained was summarized, coded, and analyzed by using Statistical Package for Social Sciences (SPSS) computer program version 12.0 Both descriptive and quantitative analysis were carried out.

Descriptive Statistics

Statistics such as means, frequency distribution, percentage, average, and cross tabulation were used. Cross tabulation analysis was used to segregate respondents characteristics based on certain criteria such as price paid to each group and

buying price along the market participants in order to determine whether or not the variable were statistically independent.

Discussion and Results Findings

Demographic Characteristics of Households

Most (88.8%) of the interviewed head of households were men while the rest (11.2%) were female household heads who are widows or divorced (Table 1).

Variables	Frequency	Percentage
Gender of Household		
Male	355	88.8
Female	45	11.2
Age of HH head		
15–65 years old	254	63.5
>65 years old	146	46.5
Education level of HH head.		
No. Education	155	38.8
Primary	217	54.2
Secondary	23	5.8

About 63.5% of respondent households were within the range of working age (15–65 years old), whereas 36.5% of them were elder (>65 years old) (Table 1). This might be related to the fact that effective and independent workers who are known to possess the physical strength required for crop production are found in this age category.

Mean family size of households of Mupika and Chilikita districts was Kahuama (4) while that of Chilikita was about 5 (Table 1). Majority of the rural residents had family size of more than five. In fact, as the number of household size increases, agricultural activities of the households were accomplished in time due to sharing of the duties among the household members. In the same way, Okoye *et al.* and Udensi *et al.* (2007) reported that a relatively large household size are more likely to provide more labor required for farm operations such as weed control, fertilizer application. However, Simonyan and Obiakor (2006) justified that large household size may not guarantee for increased labor efficiency since family comprises mostly children of school age are always in school during working period.

Most (54.2%) of the interviewed households completed primary education (Table 1), which is above the mean national literacy level of adults. This is an indication that most farmers had a fairly good education level to understand basic farming practices. The high literacy level of farmers is considered as one of the variables that positively affect adoption of agricultural technologies. Due to high literacy level, improved potato production practices can be reached to the farmers through reading materials such as pamphlets, leaflets, and other aids.

Conclusion and Recommendation

The main objective of this study was to evaluate the Irish potatoes production and marketing performance in Chavuma rural district. Specifically the study aimed at determining economic profitability of Irish potato grown by small-scale farmers; identify existing Irish potato marketing channels and the role played by key market participants and to examine the pricing structure of Irish potato at different levels of market chain with a view towards establishing margins at different levels of market channels.

Conclusion

Based on CI of retailers and transporters it can be concluded that the number of traders in Irish potato marketing system in the study area is high enough to prevent any monopolistic tendencies among traders. It is evident that Irish potato growers in Chavuma rural district have not captured the full potential benefits of production. Some problems have been noted from the study which indicated some inefficiency in the entire production marketing system. These problems are perishability of the crop, unreliable markets, uncertain prices, transportation, road blocks, low capital investment and government intervention on measurements.

Despite the far ranging effects of certain natural factors on crop yield, the potato grower himself is responsible to a large extent for the final success or failure of his crop. The survey data show a wide range in final profit margins suggesting that many producers could achieve better financial results if they paid greater attention to the factors influencing Irish potato production that are within their control.

Marketing of Irish potato crop in the study area was the main bottleneck as mentioned by farmers' especially unreliable market, uncertain price, poor infrastructure, fewer buyers, and improper measurement. This study therefore recommends that these problems should be addressed in order to improve performance of Irish potato market.

The profitability of Irish potato production depends largely on yield and product price. Results show a wide range of yield from 12-120 bags/acre, which suggests that many producers could achieve better financial results if they pay greater attention to the factors influencing Irish potato production that are within their control. One of these factors is the use of improved seed variety. This seems to be a problem since it was mentioned by 76.7% respondents that they use local variety. They do not grow improved varieties due to its unavailability and farmers' knowledge about the source. It is recommended that research should consider wide publicity of new varieties and promote them through participatory on farm research trials and demonstrations.

In potato enterprise, price fluctuates considerably depending on season. This is demonstrated by a wide range of profit margin. One way of reducing price fluctuations would be increased use of storage facilities. A local village stores could be constructed for storing potatoes for later sale.

In order for farmers to fully enjoy the benefits of a free market environment they must understand the market mechanism at play. This is only possible if farmers are organized into groups or association which will increase bargaining power. Through associations farmers can be able to mobilize saving and credit facilities which can provide funds for urgent need while speculating for higher prices when there is low supply of potatoes in the market.

The bulk of potatoes in the study area and Zambia at a large are transported in trucks and stored in warehouse that are not refrigerated. Often times great losses are experienced especially when breakdowns occur or when the trucks get stuck in the muddy roads during the rainy season. There is a need to conduct another study to analyze technical efficiency of potato transportation system in order to come up with the recommendation regarding Technology and infrastructures aimed at extending and improving the storage period of potato.

- Intensive farming system (multiple cropping), use of

area-specific recommendation of fertilizers.

- Use of cost-effective pest control methods, introducing low-cost storage facilities, and cooperation of farmers to manage market problems should be adequately addressed to improve potato production and utilization in the study area.
- The extension service should take up potato as essential and specialty commodity giving priority to enhance its productivity.
- Input provision such as intensification of farm land, irrigation access, improved seeds, fertilizers, and pesticides should also be adequately scheduled to meet the cropping calendar.
- The agricultural bureau of the zone and respective districts of the zone should also start farmer-based seed production, multiplication and storage.

Area-specific fertilizer use programs, appropriate land-use systems by cooperating with the nearby stakeholders such as higher education institutions and research centers are necessary to ensure that soil fertility will be maintained, and clean seed will be readily available. As a result, production and utilization of potato will be improved. By doing so, food security plan will also gradually meet its goal together with the strict accompany of similar food security programs.

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