

Potato Value Chain Analysis in Mauche Ward of Njoro Sub-County, Kenya

Rael J. Taiy

Ministry of Agriculture, Livestock and Fisheries
Agricultural Sector Development Support Programme
Uasin Gishu County, Kenya

Christopher Onyango

Egerton University, Department of Agricultural Education and Extension
Kenya

Agnes Nkurumwa

Egerton University, Department of Sociology and Anthropology
Kenya

Kibet Ngetich

Egerton University, Department of Crops, Horticulture and Soil Chemistry
Kenya

Rhoda Birech

Egerton University, Department of Crops, Horticulture and Soil Chemistry, Kenya

Patrick Ooro

Kenya Agricultural and Livestock Research Organization (KALRO)
Food Crops Research Institute-Njoro, Kenya

Abstract

Potato ranks second after maize as a most important staple food in Kenya and is also a steady source of income for farmers. The Kenyan potato value chain is characterized by seasonality in production, price inefficiencies and post-harvest losses. This study was conducted in Mauche Ward of Njoro Sub-County to analyse the potato value chain in order to identify the opportunities and challenges and suggest possible intervention measures. The study employed Survey Research, key informant interviews and Focus Group Discussions (FGDs) to collect data. The survey questionnaire was administered to 150 randomly sampled smallholder potato farmers. Focus group discussions engaged 10 potato input suppliers, 10 traders and 10 transporters. Key informants interviewed were purposively selected from key institutions such as Agricultural Development Corporation Molo - a major supplier of potato seed and Njoro Canning Factory, a food processor. The survey showed that 60% of the farmers were smallholders owning 2-5 acres of land. A majority of them (90%) used between 0.1 and 1 acre of their land to grow potatoes and earned K. Shs 50,000 to 70,000 per year. The study revealed a complicated value chain full of mistrust. Input suppliers complained of high cost of business licenses and credit purchases of inputs by farmers. Constraints cited by farmers included high cost of inputs, shortage of certified seed, inadequate potato storage, lack of market information and absence collective action in input acquisition and marketing. Transporters lamented about overloading by traders and high parking fees imposed by municipal markets. Traders exercised a lot of power in dictating potato prices. Recommendations for future interventions include formation of farmer cooperatives, contract farming, cottage value addition and formation of Collective Learning Communities to bring all actors along the potato value chain to address the constraints together.

Key Words: potato value chain analysis, food security, livelihood, smallholder farmers, collective learning.

1.0 Introduction

Potato is the world's fourth largest food crop after wheat, rice and maize. It is an important food crop in Kenya, with production volumes only second to maize and plays a major role in national food and nutrition security (Muthoni & Nyamongo, 2009). Potatoes are an important source of food, employment and income in developing countries (FAO, 2008). The potato's high energy content and ease of production have also made it an important component of peri-urban agriculture which provides jobs and food security to some 800 million people globally (Hoffler and Ochieng, 2008). 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. 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 labour is abundant (FAO, 2008). Kenya is the fifth biggest potato producer in Sub-Saharan Africa, with an output of more than one million tones cultivated by approximately 500,000 smallholder farmers (FAO, 2008).

In Kenya, potatoes are mainly cultivated in the high altitude areas (1500-3000 metres above sea level) where maize, Kenya's main staple food has no comparative advantage (Kiiya, Mureithi & Kiama, 2006). These areas include the slopes of Mt. Kenya, the Mau escarpment, the Nandi escarpment, Cherangany hills and the slopes of Mount Elgon. Small acreages are also cultivated in Kericho, Kisii and isolated patches in the Taita hills (Kirumba, Kinyae & Muchara, 2004). Highland farmers can complete three planting seasons with potatoes (each season being 3-4 months long) unlike maize, which takes up to 10 months in these areas to mature. Potato thus becomes a steadier source of income and is planted both as a cash crop and staple food by farmers (Kiiya *et al.*, 2006). At altitudes exceeding 2100 m above sea level, potatoes grow faster than maize and the total energy and protein production per hectare per day is higher for potatoes. 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 (Muthoni & Nyamongo, 2009).

The Kenyan potato value chain is characterized by seasonality in production and lack of on-farm ware potato storage. High transaction costs, price inefficiencies and quality losses lead to minimal returns to farmers (Kaguongo *et al.*, 2008). The market is controlled by cartels, which shield producers from receiving any market information. Due to the highly perishable nature of the potato, prices fall during the glut season, hence low net returns to farmers. Transportation of potatoes to the market is expensive due to poor road infrastructure in the producing areas (Hoeffler, 2005). Packaging of the potato in extended bags of 160 kilograms (kg) has led to exploitation of farmers by traders (Gathumbi, 2009).

This study uses a value chain analysis approach to demonstrate how smallholder potato farmers in the study area may be effectively linked to the markets by improving their potato production and marketing systems. Value chain describes the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), and delivery to final consumers and disposal after use (Kaplinski & Morris, 2003). Value chain analysis is increasingly being used because of its focus on identifying opportunities and key constraints within the chain, and its potential to identify market based solutions that promote competitiveness (Donald, 2009). The focus of this study is on the local potato value chain in Mauche. It seeks to understand the real scenario on the ground to guide local actors come up with strategies for inclusion of smallholder potato farmers into the chain. This will improve linkages between potato farmers and other value chain actors for increased production and incomes.

2.0 Materials and Methods

2.1 The Study Area

The study was carried out in Mauche Ward of Njoro Sub-County. Mauche lies in the Mau escarpment and covers an area of 166 square kilometers. Its altitude is 2100-2800m above sea level and receives an annual rainfall of 1600-2200 mm. The rainfall pattern is bimodal with the long rains received in March to August and short rains in October to December. Agro-ecological zones are Upper Highlands and Lower Highlands. Mauche has a population of 25,088 comprising of 4994 households and 5590 farm families (GOK, 2014). The main crops grown in Mauche are Maize, Potato, wheat, beans and vegetables. Livestock kept include cattle, sheep and local chicken. The livelihoods of the people in the area vary, but the main income generating activities are livestock and crop farming. Off-farm activities include businesses and salaried employment.

The main challenges to agricultural productivity include inadequate certified or clean potato seed, high cost of farm inputs, poor road network, crop pests and diseases as well as decreasing soil fertility levels which hamper realization of potential yields (GOK, 2014). Figure 1 presents the location of the study area.

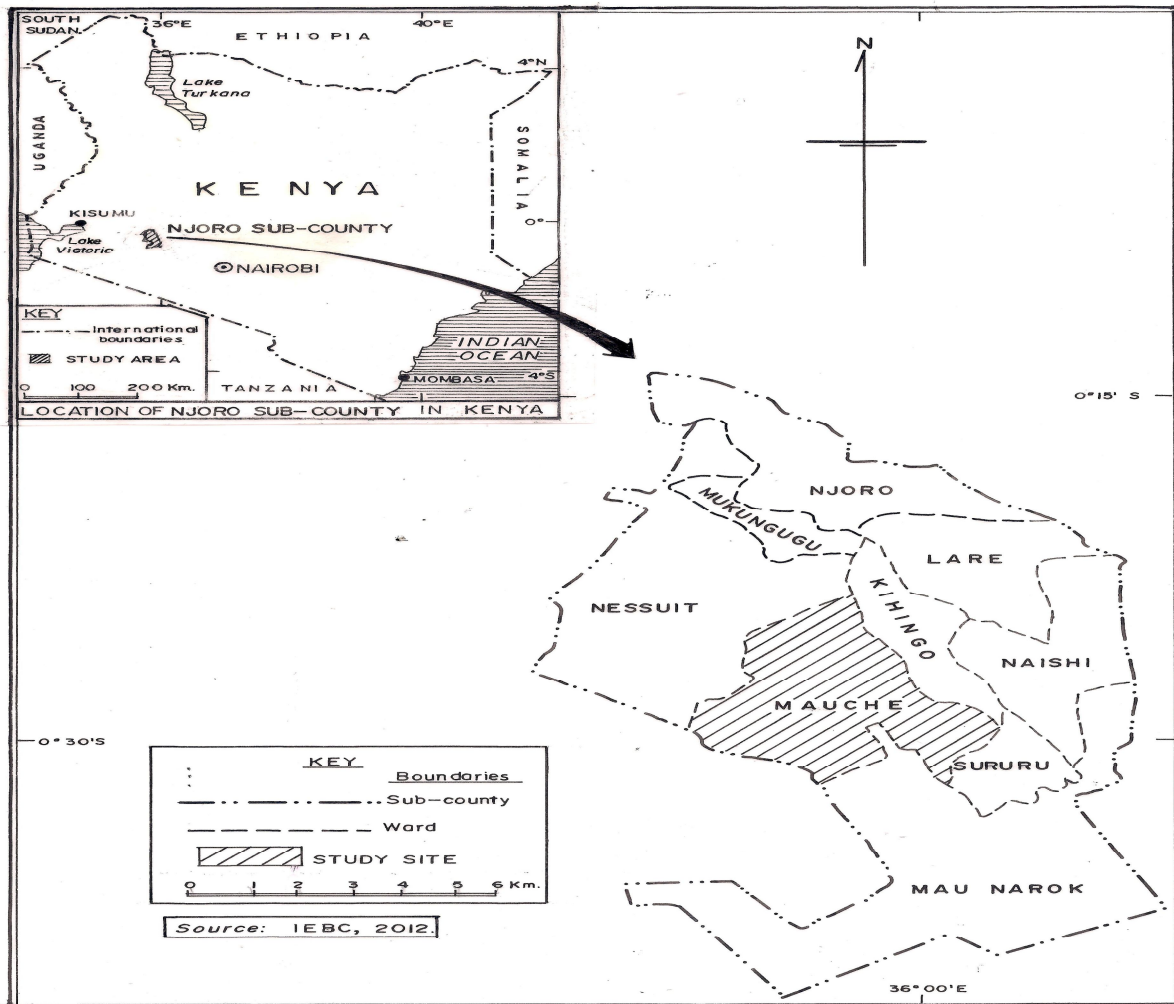


Figure 1: Location of the Study Area

2.2 Data Sources and Collection Methods

This study employed Simple Random Sampling to select 150 farmers to participate in the household survey. Purposive sampling was used to select key informants – Agricultural Development Corporation (ADC Molo) - Potato Seed multiplier, Njoro canning factory (processor) and two supermarkets in Nakuru (Ukwala and Tusksys). The study targeted managers of these organizations. Simple random sampling was employed to select ten potato traders, ten transporters and ten agricultural input suppliers to participate in FGDs.

Data collection was done in two phases. The first phase entailed use of topic guides for FGDs with potato value chain actors in Mauche Ward. Three Focus Group Discussions were conducted with input suppliers, transporters and traders. In-depth interviews were conducted with ADC Molo, Njoro Canning Factory and supermarkets with the aid of checklists. The key informant interviews and FGDs provided information on challenges and opportunities along the potato value chain in Mauche Ward. As noted by MacDonald (2012), topic guides and checklists provide extremely rich data with enormous potential for comparison.

The second phase of data collection was household survey using a pre-tested semi-structured questionnaire. The questionnaire captured socio-economic characteristics of smallholder potato farmers such as age, gender, education level, farm size, land tenure, farm enterprises and household income. It also highlighted on household practices by smallholder potato farmers such as Access to potato seed, potato storage and potato marketing, climate change challenges and adaptation strategies.

Survey data was coded and analyzed using SPSS. Qualitative data was generated from the FGDs and expert interviews using Thematic Content Analysis which, according to Braun & Clarke (2006) offers an accessible and flexible approach to analyzing qualitative data.

3.0 Results and Discussion

3.1 Socio-economic Characteristics of smallholder potato farmers

The socio-economic conditions of smallholder farmers need to be given adequate consideration. Where these conditions are poor, the farmers are unlikely to participate in development (Opara, 2010). While working with peasant farmers in South-Western Nigeria, Ongusuni (2007) found out that there is a positive relationship between age and adoption of technologies. Age of the household head predisposes a farmer to better farming techniques through “learning by doing” and better management skills. Age is assumed to increase the probability of adoption but at a decreasing rate as the age increases. The dominant age category in this study was 31-45 years.

Gender has been known to influence agricultural production through issues and concerns that surround access and control of resources for production. Men as heads of households have greater access to land; credit and extension services (GoK, 2004). The study sample was composed of more males than the females. This is a reflection of the situation in the study area where most of the households are headed by male and fewer by females. Male respondents represented 54.7% of the sample as compared to 45.3% females. Male dominance in decision making in the household and economy has continued even in areas where women are the key providers of labour because the influence of women has never been recognized (Damisa & Yohanna, 2007).

Educational status of the household head determines capacity for management and utilization of information relevant to technology adoption. Majority of the respondents (60.6%) had completed primary education, hence could read and write. As suggested by Balakrishnan (2001), there is an important link between education level, personal empowerment to escape poverty, possession of appropriate information and making of informed choices.

The size of land owned by the farmers is an important asset in that it determines the farming system that can be applied and output that can be obtained from the land. Farm sizes are known to determine production levels (Ojango & Pollot, 2002). Farm size is a direct positive correlate of productivity as it offers the farmer endowment with productive assets. Mauche farmers were relatively smallholders as 59% owned 1-5 acres of land. The type of land ownership determines the type of innovations and developments that a farmer will initiate on his land. The respondents in the study owned the land with title deeds (50%) or without title deed (42%).

The farmers relied on six different sources of income, which could be classified into two main categories: farm income and non-farm income. Farm income included income from livestock and crops, while non-farm income included incomes from salary, small scale business, relatives and money lenders. Income from the farm formed the highest portion of the farmer’s income. A considerable proportion of farmers (34.8 %) earned between K.Shs 50,000 and 70,000 annually, followed by the farmers that earned between K.Shs 30,000 and 50,000 who formed 31.8 % of the sampled households. From the feedback session with farmers, it came out clearly that farmers do not cost the food consumed in the households which is largely produced on the farm and hence perceived as free. According to Diiro (2013), off-farm earnings may induce technology adoption by providing farmers with capital for purchasing inputs.

The socio-economic characteristics of respondents are summarized in table 1.

Table 1: Socio-economic characteristics of smallholder potato farmers

Parameters	Variables	Frequency	Respondents (%)
Age category (years)	20-30	32	21.3
	31-45	75	50.0
	Over 45	43	28.7
Gender of the respondent	Male	82	54.7
	Female	68	45.3
Level of formal education attained	No formal schooling	23	15.2
	Primary	91	60.6
	Secondary	27	18.2
	Post-Secondary	9	6.1
Land size category (Acres)	0.1-1	37	24.7
	1.1-5	89	59.3
	5.1-10	24	16.0
Land allocated to potato (Acres)	0.1-1	132	88.0
	1.1-5	15	10.0
	5.1-10	3	2.0
Land Tenure	Owned with title deed	75	50.0
	Owned without title deed	64	42.7
	Rented	9	6.0
	Owned by parents/Relatives	2	1.3
Annual income categories (KSH)	<10,000	14	9.3
	10,000 – 30,000	30	20.0
	30,001 -50,000	48	32.0
	50,001 – 70,000	53	34.7
	Over 70,000	6	4.0

3.2 The potato Value Chain in Mauche

Value Chain Analysis reveals links between producers and markets; Identifies constraints along the chain; clarifies the relationships between actors in the chain. The primary focus of this study was to identify the main value chain actors, the potato marketing channels originating from the study area and relationships among the actors. Figure 2 presents the current situation of the potato value chain in Mauche.

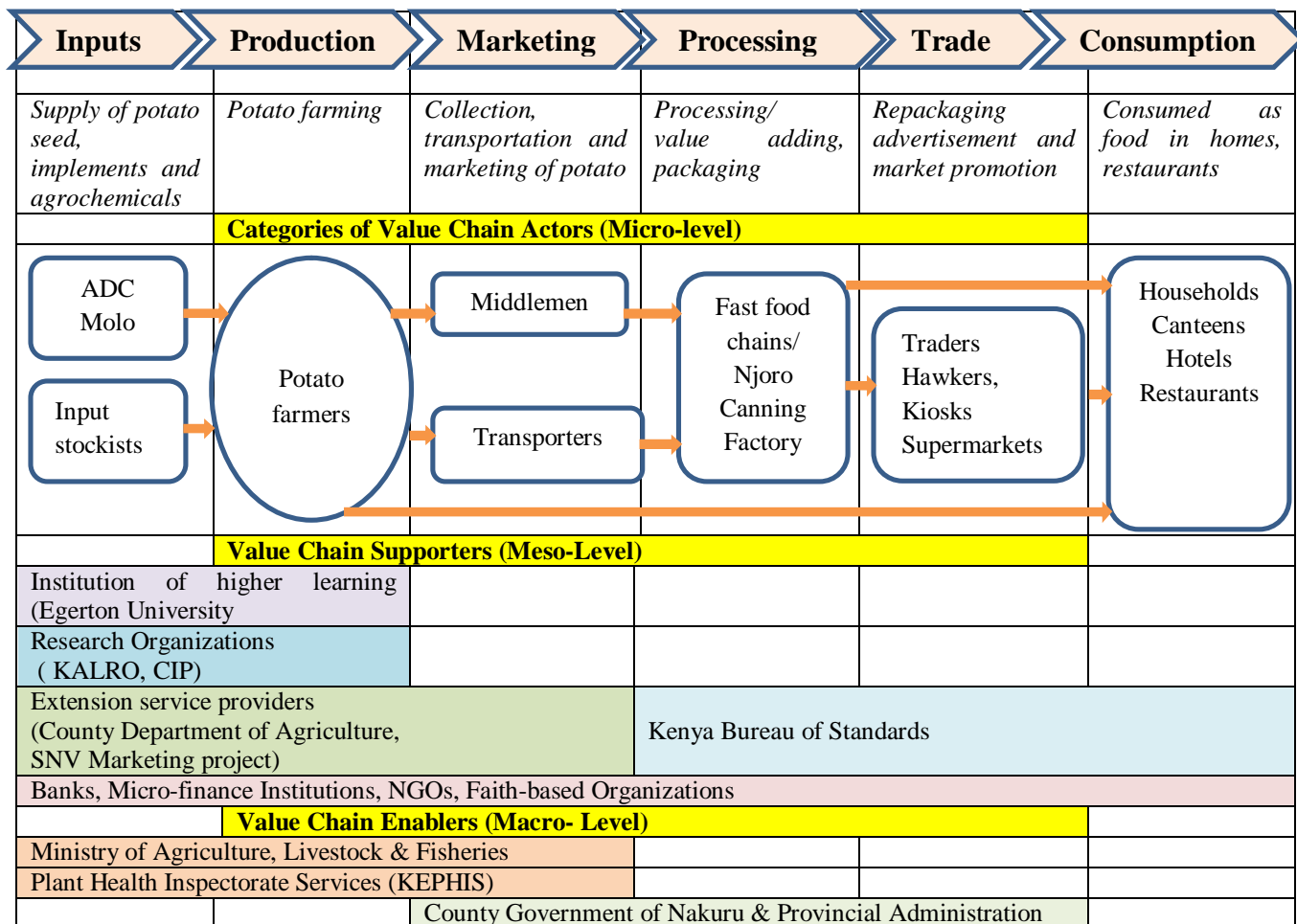


Figure 2: The potato value chain in Mauche Ward of Njoro Sub-County

The primary key actors in the chain are smallholder farmers, farm inputs suppliers, transporters, market intermediaries (traders and brokers), agro-processors, wholesalers, retailers and consumers. Value chain supporters at the meso-level include research organizations (Kenya Agricultural and Livestock Research Institute, International Potato Centre), institutions of higher learning (Egerton University), extension service providers (County department of Agriculture), financial service providers, religious social organizations and Non-Governmental Organizations. Value chain Enablers at the macro-level are the regulators, policy makers (Kenya Plant Inspectorate Services and Ministry of Agriculture, Livestock and Fisheries); and providers of resources and local administrators (Provincial Administration and the County Government of Nakuru).

3.2.1 Potato input supply

The potato value chain in Mauche begins with the input supply. A majority of the sampled farmers (47.3 %) identified open air markets as their main source of potato seed, followed by private suppliers (34.7 %). Farmer-to-farmer exchange of seed accounted for 8%; farmers obtaining seed through their self-help group accounted for 8%; whereas ADC Molo supplied seed to 3% of the respondents. Discussions with the farmers pointed out that there is no active cooperative society in Mauche.

Potato agro-chemicals sold included inorganic fertilizer (Di-ammonium phosphate, foliar feed), fungicides, insecticides, herbicides and soil conditioners. These are obtained from agro-chemical companies operating in Mauche such as Amiran, Osho Limited, Green life, Syngenta, coopers and Ultra-vetis through local stockists. Main Challenges facing farm input stockists include: Shortage of supply due to delay in importation; misuse of agro-chemicals by farmers with inadequate technical knowhow leading to ineffectiveness; fluctuating prices of products charged by suppliers; credit borrowing of agro-chemicals by farmers and high charges for business licenses by the County Government of Nakuru. The main certified seed supplier in Mauche is ADC Molo.

The institution cited climate change related challenges to seed production such as severe cold temperatures resulting in frost, unpredictable and irregular rains, high post-harvest losses, rampant diseases in the field, water logging pest infestations such as leaf miners and cutworms. Coping strategies include use of green houses to produce seeds, Proper agronomic practices, ridging on time to ensure proper establishment of roots of the tubers, tree planting- to ensure controlled climates and wind breaks for crops at the farms. There are 17 varieties maintained at ADC Molo with 8 key varieties being in large amounts due to high demand by farmers - D. Robyjn, K. Karibu, Tigoni, Asanté, K. Mpya, K. Sifa, K. Sherekea, K. Mavuno. Long maturing varieties such as K. Karibu, K. Sifa and K. Mavuno show some resistance to blight. Other challenges include shortage of breeders' seed, unpredictable weather conditions and high cost of inputs especially fuel, fertilizers, inspection costs.

3.2.2 Potato production

The first link in the potato value chain is Potato production. In Mauche potato is an important food security and income generating activity. It is practiced by smallholder farmers who mainly allocate up to one acre of land for potato growing. This is usually done in two seasons per year. With proper management, a farmer may harvest more than 60bags of 110kg each per acre in one season. But farmers complain about rampant pests and diseases such as blight which is common during the rainy season. This calls for a higher use of agro-chemicals which reduces the profit margin of potato. Mauche is a high rainfall zone; hence excess water run-off damages the road network making it impossible for the farmers to access the market. It also causes severe soil erosion on the farms hence reduced soil fertility which subsequently leads to reduced potato yields.

Access to clean potato seed is a major challenge. Farmers cited unavailability of certified seed when it is needed as well as the high cost of seed. Lack of appropriate potato storage at the farm level has been a major issue. Farmers store their potato in multi-purpose stores. Appropriate storage is requisite for food security. As noted by Bouis (2008), there are four dimensions of food security namely: food availability, stability of food supplies, access to food and food utilization. Figure 3 is a typical storage facility in Mauche.



Figure 3: A farmer admires a potato tuber in a Multi-purpose store

Farmers presented potato marketing constraints which included low potato prices and lack of collective action, poor transportation to the market, lack of market information, low quality produce, poor linkage to the market and inadequate storage. Governance in price determination is market-based. Here there is little or no formal cooperation among buyers and sellers in price determination. The prices are determined by the extent of supply and demand in the market. Due to this, Farmers in Mauche are prone to exploitation by potato cartels that pay low prices for potatoes in extended bags. Farmers complained that traders extend the 110kg bag to 160kg and the 50kg bag to 80kg after the legislation to control extension of the potato bag was taken to court by interested parties. Due to lack of collective marketing by the farmers they are not able to bargain for better prices. Lack of cold storage in Mauche aggravates the situation as potato is a highly perishable produce hence farmers are forced to dispose of the produce immediately after harvesting. When there is glut the extended 50kg and 110kg are sold for ksh 800 and kshs 1400 per bag respectively. Figure 4 and Figure 5 illustrate the extended 50kg and 110kg bags.



Figure 4: Extended 50kg potato bag



Figure 5: Extended 110kg potato bag

3.2.3 Potato Marketing

The second link in the chain is potato marketing. The main players are potato transporters and middlemen or brokers. Potatoes in Mauche are transported from the farmers by brokers using hired Motorcycles and Lorries. In some cases, the transporters are also brokers. The main challenges cited by transporters include overloading when brokers extend the bags to more than 150 kg. This is aggravated by poor access roads which are very muddy during the rainy season.

Mauche being close to the Nakuru-Narok border, transporters complained of multiple taxation by the County governments of Narok and Nakuru. They also have to meet levies charged by traffic police and villagers who erect barriers on the roads. When they transport potatoes to city markets, there is inadequate parking space for potato trucks. Since there is no off-loading of potatoes in the market, transporters have to meet daily parking charges for potato trucks which range from shs 400-1200.

Traders purchase potatoes from farmers through brokers. Available potato varieties are Shangji, Tigoni and Kenya Mpya. The most preferred variety is Shangji which has a higher demand in the open air market. The market outlets are Nakuru, Nairobi, Mombasa, Sirare, Kisii, Mombasa, Homabay and Uganda. A bag of potato in Nakuru Municipal market attracts a 40% increase in prices compared to Mauche. The main challenges reported by traders are losses due to unscrupulous farmers or brokers packing small or rotten potatoes inside the bags. They have no adequate storage facilities and may suffer post-harvest losses due to rotting. Very huge tubers are not popular since they are associated with over use of agro-chemicals.

3.2.5 Processors

Njoro Canning Factory receives potatoes from contracted farmers and negotiates the prices with the farmers. The most preferred potato variety for processing is Tigoni which has a better storage quality. The factory processes potato into chips and potato cubes which is supplied in frozen form to supermarkets. Climate variability affects supply of potatoes to the factory. Too much rain leads to poor quality of potato due to disease and pest incidences. Low quality of potato produces low quality chips which cannot compete in the supermarkets. Application of climate change adaptation strategies such as soil and water management and crop intensification practices may help maintain potato quality.

3.2.6 Consumers

Tuskys and Ukwala supermarkets in Nakuru receive potatoes from contracted suppliers or farmers. They demand for clean potatoes without splits. The supermarkets can pay a better price for a higher quality produce. Potatoes prices are pegged on weight in Kilograms. At the time of this study, supermarkets were paying ksh 30/kg which was 200% higher than the farm gate price of potato in Mauche. Supermarkets have no storage problems since they purchase enough to keep on shelves.

4.0 Conclusions and Recommendations

Potato farmers are price takers. They do not have power to set prices in a system dominated by middlemen who take advantage of market information imperfections resulting in opportunistic behavior that suppresses potato farm gate prices in Mauche. Lack of collective action and absence of well-coordinated marketing channels lead to low income for potato farmers. The price paid to potato farmers by brokers is insensitive to quality and provides no incentive to farmers to improve the quality of potato. Recommendations for future interventions include encouraging farmers to form cooperatives and engage in contract farming in order to overcome technological and market constraints.

Potato is a highly perishable produce and its quality deteriorates fast after harvest. This leads to a glut in the market during harvest season; hence low returns for farmers. Promotion of equitable market access may be achieved by improving rural transportation infrastructure and cold storage as well as cottage value addition facilities in Mauche. There is need to form a Collective Learning Community comprising of all actors along the potato value chain in Mauche in order to enhance chain coordination, reduce transaction costs, increase market efficiencies and facilitate realization of economies of scale.

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