

**A REVIEW OF INSTITUTIONAL FACTORS THAT INFLUENCE SMALLHOLDER
POTATO FARMERS' VALUE ADDITION IN DEVELOPING COUNTRIES:
IMPLICATIONS FOR UGANDA**

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ABSTRACT

The review analyses the Institutional factors that influence potato value addition in Uganda. The review sought to; identify the key critical institutional factors that contribute to supporting the potato value chain, and discuss how these factors can be used to support the development of the value chain in Uganda. The review based on secondary review to come up with findings. It applied a quantitative approach that involved data extraction from sources like online books, journals, reports articles and media. Potato production and value addition in Uganda is primarily performed by numerous players including; farmers/producers, marketers (agents and traders), and processors. These actors determine the volume and quality of traded potato, per capita value added product and price outcomes in the Irish Potato subsector. Though there is a remarkable progress in boosting per capita potato value added product, major players are still restrained by institutional setbacks such as; un-reliable supply of quality seed inputs, fertilizer and pesticide, limited access to credit services, transport infrastructure and transport costs, limited access to market information, services, and technology, lack of storage infrastructure, limited market access, poor market infrastructure, poor organization of the sector, poor legal environment and lack of proper policies related to smallholder farmers. The constraints must be addressed for Uganda to optimally exploit its full potato production potential and upgrade its entire value chain. It is recommended that government together with private sector channel credit facilities through existing farmer groups to increase access to credit through either capitalizing farmer group-level VSLAs or lending to farmer groups instead of individuals. This can enable farmers acquire the necessary equipment needed for value addition. There is also need to upgrade infrastructure and more importantly, community and market stores that support the functionality of the traders who are the key actors throughout the Irish Potato value chain.

Keywords: Institutional factors, value addition, potato value chain, Uganda.

1. INTRODUCTION

Potato also known as Irish potato (*Solanum tuberosum*) is grown worldwide. Potato is the fourth most important food crop in the world in terms of production with 388 million tons produced in 2017, following rice, wheat and maize (FAOSTAT, 2019). Potato is a major crop for food security due to its high nutritional value (FAO 2008; Bernal-Galeano V. & Norton G. 2020).

Not only is potato an important crop for food and income generation but it is also one of the 16 major food crops prioritized by the Government of Uganda (UBOS, 2018; Kisakye, S. *et al*, 2020). Due to growing demand, potato has been identified by Uganda's Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) in its development strategy and investment plan as a

priority crop for strategic intervention. (UBOS & MAAIF, 2011; Kisakye, S. *et al*, 2020). Potato (or Irish potato as it is commonly known in Uganda) is an important strategic commodity recognized by the government as a potential driver of improved rural livelihoods (Mbowa and Mwesigye, 2016).

Irish potato is both a subsistence and cash crop of critical importance to low-income producers and consumers in most East African countries including Uganda (*Tatwangire et al*, 2017). Much of the potato in East Africa and Uganda in particular is grown by smallholders who own less than one hectare of land per household (Sebatta *et al*, 2014). In Uganda, the main production areas are the highlands of Kigezi, Rwenzori, Ankole, in the west; Nebbi, in the north; Mbale, Kapchorwa, and Bugisu, in the eastern parts of the country. The Kabale and Kisoro districts in the western part account for 60% of Uganda's potato production (FAO STAT 2012; Bonabana *et al*, 2013; Sebatta *et al*, 2014). In recent years, the introduction of lowland varieties extended the crop to other regions like the central and west Nile as a commercial activity and increased potato output over the years (Sebatta *et al*, 2014). According to UBOS (2018), the national production of Irish potatoes was 327,300 MT, from an estimated planted area of 111,100 Hectares (Ha). The production of Irish potatoes generally followed an upward trend from 155,000 MT in 2005/06 to 327,000 MT in 2018. In addition, MAAIF 2010; Mbowa and Mwesigye, 2015, potato is recognized as one of the strategic commodities with potential to boost income of value chain actors.

Over the five-year implementation period of the Agriculture Sector Strategic Plan (ASSP) for the period 2015/16 to 2019/20, activities focused on four priority areas, key among those was; improving agricultural markets and value addition in the prioritized commodities; and, institutional strengthening for agricultural development. The strategic agricultural commodities for the ASSP are: bananas; beans; rice; tea; coffee; cassava; fruits and vegetables; fish; cocoa; meat (beef, cattle, goats, poultry, and pork); Irish potatoes; and oil palm and oil seed crops. (Uganda Vision 2040).

In East Africa, Uganda is the 3rd largest producer of potatoes after Rwanda and Kenya, and its higher altitude areas are well placed to benefit from the growing demand for potato products in the region (Kisakye, S.,*et al*, 2020).

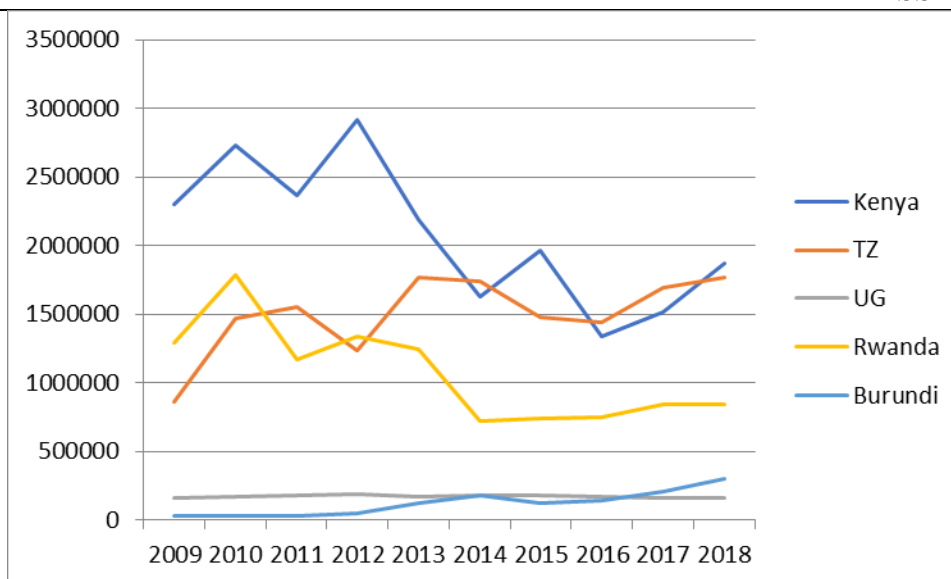


Figure 1: Potato production among the East African Community (2009-2018)

Source: FAOSTAT Data, 2020

Potato production is primarily supported by numerous chain players: agro-input dealers, seed multipliers, farmers/producers, marketers (agents and traders), and processors. Although progress has been made at various levels of the value chain, challenges remain that must be addressed before Uganda can optimally exploit its full potato production potential and upgrade its entire value chain (Mbowa *et al*, 2016). Potato farmers and other value chain actors face a number of challenges, including: the bulkiness and high perishability of the crop; inadequate use of recommended postharvest handling practices; limited storage and processing facilities; lack of bulking; high postharvest losses; limited value adding; high transport costs and; poor connectivity between the production areas and final markets. According to the Government of Uganda (2015), these constraints reduce profit margins, hinder innovation, undermine value addition along the supply chain, and limit the realization of the potential of ware potato enterprise to fully make a contribution towards food and income security. Swaibu *et al*, 2016 observed that, value addition that would be critical in upgrading the entire potato value chain remains limited.

Critical analysis of the Value chain actors and demand trends shows that the growing urbanization and demand from urban consumers have provided emerging market potentials for potato and potato products (Bonabana-Wabbi *et al.*, 2013). Although potato production is largely localized in few areas of Uganda, its supply chain commonly ends in almost all the urban markets and restaurants in the country, hence bringing many market chain actors into play (Kisakye, S. *et al*, 2020). The level of potato marketing and domestic demand of ware potato products is on the increase. Key players along the ware potato value chains include farmers, agents (or brokers), local traders, urban wholesalers, urban retailers, processors, and consumers. It is noted that most wholesalers sell directly to markets and hotels in big towns such as Kampala. Products from the processing of potato tubers include boiled potato, chips, and crisps (Tatwangire and Nabukeera, 2017).

Given the importance of potatoes in Uganda, it was necessary to understand what the situation of the potato sub-sector is in the country in terms of value addition and also map the different actors in the value chain. If indeed, potential exists for potato to boost income of value chain actors, the current level of production seems to suggest that there are institutional factors, among other things, that hinder full exploitation of this potential.

2. THEORETICAL FRAMEWORK

In order to analyze the institutional factors along the potato value chain, and the upstream and downstream interactions, the concept of institutions is important for this review.

Byamugisha, (2014) defines institutions as ‘the humanly devised constraints that structure human interaction. They are made up of formal constraints (rules, laws, constitutions), informal constraints (norms of behavior, conventions, and self-imposed codes of conduct), and their enforcement characteristics. Together they define the incentive structure of societies and specifically economies’. On the other hand, institutional factors were the policy, financial, legal, political, regulatory and social frameworks that influenced smallholder participation in potato value chain development.

An institutional environment involves input supply, research, extension, credit, technology, infrastructure, information, quality standards, and the functioning of the legal system protecting value chains. It also includes informal institutions such as social networks. Thus, the first order of economizing transaction costs along chains is to get the institutional environment right (Bonabana-Wabbi et al., 2013). Institutional arrangements are important in a world of incomplete contracts in order to make contractual relations stable, to create specific mechanisms for coordinating activities, to organize transactions, and to solve disputes across the value chains (Okoboi, 2001). Institutional arrangements (governance structures) infuse order in relationships where potential conflict threatens to undo opportunities to realize mutual gains.

According to literature, value chain refers to a range of activities required to bring a product from conception through the different stages of production to final delivery to consumers. (Kaplinsky, 1999; Kaplinsky & Morris 2001; M4P, 2008). *Value addition* is the process of changing or transforming a product from its original state to a more valuable state. The concept of the value chain encompasses the issues of organizations and coordination, the strategies and power relationships of the different actors in the chain (M4P, 2008).

Agricultural value addition involves increasing the economic value of a commodity through particular production processes, e.g., organic produce, or through regionally branded products that increase consumer appeal and willingness to pay a premium over similar but undifferentiated products.

Value-added agriculture is a portfolio of agricultural practices that enable farmers to align with consumer preferences for agricultural or food products with form, space, time, identity, and quality characteristics that are not present in conventionally-produced raw agricultural commodities. Value-added agriculture can be characterized by farmers changing their position on the supply chain, creating closer or direct linkages between themselves and consumers, or changing production processes to alter or preserve certain intrinsic characteristics of their farm/ranch products (Ruoxi Lu and Rebekka Dudensing, 2015)

Porter (1985) argues that the value chain provides a tool that firms can use to determine their source of competitive advantage. Porter used the concept to include all of the activities that a firm performs to design, produce, market, deliver and support its product. In particular, Porter argued that the sources of competitive advantage cannot be detected by looking at the firm as a whole, but by separating it into a series of activities and competitive advantage found in one or more of those activities (M4P, 2008). Value chain analysis of agriculture can be used to examine the role of upgrading within the chain. Governance issues (i.e. the structure of regulation, entry barriers, trade restrictions, and standards can shape and influence the environment in which upgrading can take place. The value chain approach also emphasizes on other factors that influence the chain's performance, including access to and the requirements of terminal markets, the legal, regulatory and policy environment, and the availability and quality of support services such as financial services, equipment manufacture and repair, business management services and information technology (Edakkandi M. R.2012). Value chain development is fundamentally about strengthening market relationships so that businesses work better together to compete more effectively in the global market (Meihlbradt A. O. and M. McVay, 2005; Edakkandi M. R.2012).

The study employed the value chain analysis (functional analysis) of potatoes which was based on a desk literature search from reports made about the enterprise in Uganda. The functional analysis was used to define the actors in the potato value chains and the roles they play in the chain were identified. From the key informant interviews (Kisakye, S. *et al*, 2020), value chain actors associated with potato include the following: Bulk buyers/ transporters/ dealers; Brokers; Small scale retailers; Individual buyers; hotels and restaurants; Kiosk and fast food restaurant dealers; Roadside dealers/ small scale; farmers and farmer organizations; and people living in and around production areas. By understanding this, value chain actors can better leverage their strengths, correct their weaknesses, capitalize on golden opportunities, and deter potential threats.

Mbowa and Mwesigye in 2016 during their study in Western Uganda, observed that there has been very limited success in developing functioning commodity value chains in Uganda, and this was consistent with the evidence that there is limited value addition from Irish Potato production. Their findings are in line with Ferris *et al*, 2001 that alludes to the limited processing that occurs in Uganda's Irish Potato value chain.

The market demand for potato in Uganda is expanding and this is attributed to the rapid urban population growth and changing food eating habits of urban dwellers. To a great extent, potato is demanded by the urban population in various forms including chips, crisps and French fries (J.G. Wang'ombe, 2008; Kisakye, S. *et al*, 2020). Government efforts have mainly focused on research and development to boost potato production and market participation, and addressing socio-economic factors surrounding potato production (Mbowa and Mwesigye, 2016). Little has been done to analyze the institutional factors limiting the actors' participation in the chain, and overall chain development. Yet understanding institutional barriers to value addition and value chain participation is key to unlocking the market potential of the value chain and enhancing value chain development. This paper therefore aims to review and discuss the institutional factors that influence potato value addition in developing countries, and draws lessons for the potato industry in Uganda. The specific objectives are to identify and map the potato value chain in Uganda, identify the associated institutional factors at each stage of the value chain, with a view of proposing appropriate policy action. Despite the growing demand for potato and its

products locally and the neighboring countries, potato value chain actors in Uganda continue to demonstrate low participation in the market.

3. METHODOLOGY

According to Anthony, (2010), review methodology refers to a way to systematically solving the review problem. It is understood as a science of studying how the review is done scientifically.

This study reviewed potato value addition and associated limiting institutional factors in Uganda. A mixture of designs was applied in reviewing data. The data reviewed in this paper was purely secondary from available published literature. The review utilized both qualitative and quantitative data from the nationally and internationally respective data sets collected from online books, journals, reports articles and media. The inclusion- exclusion criteria used was primarily secondary data sources from year 2010 to date, since potato value chain development is a new approach in Africa and especially in Uganda, data from beyond 2010 was not relevant for this review. Data abstraction involved gathering applicable information from each primary study included in the review and deciding whether it was relevant to the study problem. The data captured and reviewed was dependent on the objectives set. Analyzing and synthesizing data involved collating, summarizing, aggregating, organizing, and comparing the evidence extracted from the included studies. To critically analyze the influence institution factors at every stage of the chain, value chain mapping was key in grouping value chain actors. The extracted data was presented in a meaningful way that suggests a new contribution to the extant literature.

4. RESULTS AND DISCUSSION

Potato farmers and other Value Chain actors face a number of challenges, including: the bulkiness and high perishability of the crop; inadequate use of recommended postharvest handling practices; limited storage and processing facilities; lack of bulking; high postharvest losses (PHL); limited value adding; high transport costs and; poor connectivity between the production areas and final markets. According to the Government of Uganda (2015), these constraints reduce profit margins, hinder innovation, undermine value addition along the supply chain, and limit the realization of the potential of ware potato enterprise to fully make a contribution towards food and income security (Tatwangire A. et al 2017). There exist real opportunities for agro-processing and value addition to increase the benefits from ware potato production and marketing in the country Government of Uganda (Government of Uganda, 2015; Tatwangire A. et al, 2017).

Participation in simple value adding activities such as sorting, storage, packaging, and branding are likely to have a positive effect on farmer incomes and marketing outcomes. The ability to adopt technologies that extend potato shelf-life, improve the quality of the potato product through recommended practices of storage, sorting, packaging, and branding may create opportunities to sell into distant high end markets that attract better prices and consumer appeal.

4.1 Mapping the potato value chain actors and their roles

A value chain consists of all value-generating activities (sequential or otherwise) which are needed to produce, deliver and dispose of a commodity (Schmitz, 2005; USAID 2010). Since activities may belong to different sectors of the economy, commodity value chain analysis is a multi-sectoral framework for studying the inter-linkages among the activities associated with the

commodity. Thus, value chain analysis primarily involves drawing the economic map or footprint of inputs arising directly from the production, use and disposal of a commodity. USAID (2010)

The potato value chain in Uganda comprised of a number of participants (actors). Key players along the potato value chains range from farmers, agents or brokers, local traders, urban wholesalers, urban retailers, processors, and consumers. The chain is further backed by support services and enabling environment. From the diagram below, the *micro*-level of value chain process actors includes input suppliers, farmers (producers), processors, traders (retailers and wholesalers), and consumers. The *micro*-level actors own a product either as an input (e.g., fertilizer) or as Irish Potato seed or ware. The farmers within the context of this study grow Irish Potato; at the end of the value chain are the consumers who extract Irish Potato's final value. The middle section of the micro level of the value chain consists of a multitude of firms, each of which performs a unique function on the chain (i.e., transporting, processing and packaging, storing, selling, buying, and grading), each making decisions to support the flow of the produced Irish Potato to the consumer. The *meso* level of the chain includes actors that provide a range of services (i.e., extension, research, finance, transport, innovation and communication, etc.). The *macro*-level component of the value chain framework is composed of the enablers, which primarily include institutions such as national and local government agencies, regulatory bodies, and the World Trade Organization (WTO), among others, providing an enabling environment for effective operations along the value chain.

Key value chain actors and their roles

Input suppliers; there are many actors engaged directly or indirectly in agricultural input supply. These include; seed multiplying centers, private traders, cooperatives and farmers. These input suppliers provide potato seeds, fertilizers farm tools, pesticides and herbicide chemicals.

Producers; their average land holding size is about 2.5 hectare per household. These potato growers perform different activities including planting, fertilization, weeding, pest/disease controlling, harvesting, post-harvest handling and transporting to selling areas. They are the major actors who perform most of the value chain functions right from farm inputs preparation on their farms or procurement of the inputs from other sources to post harvest handling and marketing.

Commission men; these actors play crucial role in potato marketing system by facilitating potato transaction and linking producers with other actors. They work for local traders in areas of production. They move down to communicate with producers and set selling prices for potato as far as possible. They also provide quick and readily information regarding potato marketing system. They further play an important role in linking up farmers to market and other stakeholders in the commodity chain where the probability of market accession of farmers is limited.

Rural hawkers; these are few in numbers and not widely available in the region but they are not organized in business arena. Rural vendors/hawkers buy dried sweet potato or fresh direct from farmers. They are inadequate by capital and know where to sell. Their major transport means is bicycle and or by hiring handcart or pushcart/ox-carts.

Local traders; they serve as potato buyers as well as input raw input suppliers. They are somewhat strong financially as well as management know how in all aspects of the business activity in relative with actors of this chain. Traders purchase potato from producers directly by physically and by commission men. They have opportunities to sell their potato directly to wholesalers and retailers in urban centres. Traders have a great role in the transaction of the potato production from farmers and they are price makers at all frame gate transaction in the study area.

Traveling traders; travelling traders are traders who own trucks or hire trucks to purchase potato from production areas. Such traders have no direct contact with the buyers whatsoever, so they rely entirely on brokers through a 'gentleman's agreement'. Upon agreeing a price with the travelling trader, the broker then negotiates for a 'good' price with the buyer. However, the trader may reduce the price in the case of low turnover to avoid overhead costs such as transport surcharges from truck owners, overnight parking and lodging.

Wholesalers: these are based in major towns, they are equipped with marketing facilities-transport, storage, and communication and with functionaries like commission men, weigh man, etc. In most cases, the role of wholesalers appears to be taken over by brokers, who have become one of the most prominent participants in the potato marketing chain. In rural areas, brokers are the contact between travelling traders and wholesale buyers and farmers, as well as the key link between farmers and traders.

Retailers; these sell potato in small quantity as per the consumer's requirements. Potato retailers range from supermarkets to village roadside sellers. In urban areas, market retailers buy 1-5 bags from brokers and then sell them in heaps of various sizes and grades. Retailers' activities in potato marketing system include buying, transporting to retail areas, and selling to consumers. They are key actors and last link between producers and consumers. Most of retailer bought potato from wholesalers and resale to urban consumers.

Consumers: these include households, restaurants and institutions are the major potato consumers. Potato outputs are transported from villages and sold to processors (Hotels and Restraints).

Support providers (Indirect Actors); support service providers are essential for value chain development and include sector specific input and equipment providers, financial services, business management services, and market information access and dissemination, technology suppliers, advisory service, etc. In the study areas, there are many institutions supporting the potato value chain. The most common support providers are Agricultural offices, private companies; research centers traders, Cooperative and custom and revenue office, Universities.

4.2 Institutional factors that influence potato value addition in Uganda

Mmasa JJ. (2013) defined value addition as the process of changing or transforming a product from its original state to a more valuable state through creating value, innovation or industrial innovation at an advanced stage. Value can be added to agricultural products through form (cleaning, sorting, grading and cooling), location, time, ownership and information (and Coltrain D et al 2000; Nakamoto S. et al 2004). Available literature on value addition to crop produce shows that it is a way of enhancing farmer's incomes as well as accessing lucrative markets.

Dorward A, Kydd J, Poulton (2008) argued that cash crop development in terms of value addition offers some opportunities for meeting challenges faced by smallholder farmers in accessing markets.

Although there is a general positive trend in potato production volumes, at the processing level, there is little value addition taking place as most potato is eaten in fresh form and only little is processed into chips and crisps. Processing constraints include: low quality of ware potato, fluctuating prices of ware potato and inadequate working capital.

Sebatta C. et al (2014) in their study conducted in the highland districts of Kabale and Mbale, Uganda reported that after harvesting potato, a series of operations known as post-harvest operations are needed to make it reach the consumer's table. Potato being a perishable and bulky agricultural commodity, appropriate and efficient post-harvest technology and marketing are critical to the entire production-consumption system. If potato farmers are going to take up post-harvest value addition, there should be incentives that attract them to do so and these can be in terms of higher prices for the produce to which value is added or lower cost value addition materials.

From the literatures reviewed, a number of institutional factors confronting players in potato value addition were established and discussed below;

4.3 Lack of a reliable supply of quality seed inputs

Mugisha et al., (2010) in their study in Uganda, stated that Uganda's Irish Potato production is constrained by the lack of a reliable supply of quality inputs, including clean seed, fertilizers and pesticides. There is limited access to improved seed because of the limited supply of seed potatoes from the Kachwekano Zonal Agriculture Research and Development Institute (KAZARDI), the institution mandated to produce basic seed. Uganda's seed Irish Potato production system is supported by a mix of three actors at different levels of production and efficiency, including; (i) the Kachwekano Zonal Agricultural Research Development Institute (KAZARDI), which is the mandated public agency under the auspices of the National Agricultural Research Organization (NARO); (ii) the informal and unregulated farmer-driven but handy system, dependent on recycling of retained seed; and (iii) the largely donor supported team of private seed Irish Potato multipliers. Having these three actors in place emanates from KAZARDI's limited capacity to produce seed Irish Potato that meets Uganda's ever-growing demand. This study proves that access to improved seed is one of the major constraining factors limiting the upgrading of the Irish Potato value chain.

Mbowa. S et al (2016) in Western Uganda reported that, given that variety and size are considered as key Irish Potato valuation attributes, there is a need for research institutes such as the Kachwekano Zonal Agriculture Research Development Institute (KAZARDI) to create robust Irish Potato varieties that meet the attributes preferred by the market. Value addition is constrained by the inconsistent supply of the varieties of Irish Potato seeds (such as Kachpot 1) that are suitable for the production of crisps. In particular, there is a mismatch between seed Irish Potato that is demanded for processing and what is produced. Mbowa. S et al (2016) also established that considering the many Irish Potato varieties produced and traded, only a limited number of Irish Potato varieties support substantive value addition. The problem linked to the

lack of Irish Potato varieties for processing at the industrial level was identified during a key informant interview with some of the staff working for the existing industrial-level Irish Potato processing plants in the Kigezi sub-region. These were the Kisoro Irish Potato Processing Industry (KPPIL) and the Business Incubation and Value Addition Centre in Kabale district.

One of the strategies for backstopping KAZARDI's limited capacity is the decentralization of seed multiplication to private sector actors. Enablers such as research programs initiated by the International Fertilizer Development Centre (IFDC) at KAZARDI should start a farmer-driven seed Irish Potato multiplication program (NAADS, 2015).

4.4 Un-reliable fertilizer and pesticide supplies

Horton et al., (2010) observed that Irish production in Uganda is constrained by the lack of a reliable supply of fertilizers and pesticides. According to them, Uganda has neither commercial stores nor cold chain facilities. There is a general lack of organization in the marketing chain, particularly amongst producers, leading to a lack of coordination and subsequently, considerable price instability. Because of the lack of transparency and the poor market structure, brokers can charge excessive fees for their services and travelling traders make the bulk of the profit in the supply chain. The study found that most of Uganda's Irish Potato farmers are subsistence oriented and produce Irish Potatoes using low-risk systems with no inputs, resulting in yields of 4-7 mt/ha.

Mbowa. S et al (2016) in Western Uganda, shows that there is a high demand both for inputs that can control pests and diseases and for inputs that can replenish soils because soil exhaustion is a challenge to most Irish Potato farmers in the Kigezi sub-region. Given that there are few and sometimes no agro-input shops in rural communities, these quantities indicate that input supply is inadequate. The sources of agro inputs are far from the selling locations. These long distances lead to high transportation costs, which translate into high input costs. Long distances and thus high transaction costs contribute to large differences between buying and selling prices. The reason for the large differences between the buying and selling costs might be high transportation costs. Additionally, the higher selling price might suggest the oligopolistic tendencies exhibited by the agro-input dealers because they are few compared to the available market. Therefore, efforts to bridge the distance between the sources and target markets of inputs should be a priority area in the Irish Potato zonal investment plan (ZIP).

4.5 Limited access to finance

Limited access to financing is a challenge to potato production, and value addition. All the actors involved in value addition experience financial constraints because of collateral requirements and long loan application processes. As a result, farmers and processors receive credit from informal credit sources such as Village Savings and Loan Associations (VSLAs). Like farmers, potato traders and small-scale processors also mainly obtain loans from VSLAs, but largely rely on personal savings to invest in their businesses. As mentioned above, the major limitation of VSLAs is that the sizes of approved loans are usually smaller than what is required. One limitation of VSLAs is being less capitalized and as such loans tend to be small (Kato, 2015). In addition, VSLAs charge a higher interest of close to 8% per month which is higher than most

market rates, with the exception of private money lenders, who charge 15%. Despite high interest rates, VSLAs have better repayment terms, which usually involve deducting the amount owed from the member's shares. Interestingly, fewer players reported exploiting the relatively cheaper credit from commercial banks and micro-finance institutions (MFIs), whose interest rates are 2.5% and 2%, respectively.

Mwesigye F et al (2016) discovered that access to affordable finance remains a challenge to potato producers, input dealers, marketers and processors in Uganda. The key constraints to accessing credit from formal financial institutions are long loan application processes and collateral requirements. On the other hand, undercapitalization and high interest rates limit the capacity of informal credit sources to satisfy credit demands of the value chain actors. Sebatta C. et al (2017) discovered smallholder potato farmers cannot easily invest in high yielding potato seed varieties, fertilizers or agrochemicals in times when they are cash constrained. Kaguongo W. et al (2008) found that 15% of the farmers in Kabale had not accessed credit a year before. This was in agreement with the findings of Johnson M et al (2003) which stated that in Uganda and Africa in general, rural economies have remained backward under conditions of poor infrastructure and access to credit.

The consequences of limited financing of value chain actors are low productivity and technology adoption at farm level which affect the business growth in potato trading and processing

A study by (Kyomugisha *et al.*, 2012) in Uganda revealed a gap in agriculture financing, which is an impediment to agricultural investment, technology adoption and, thus, agricultural productivity. Therefore, commercial banks need to offer loans at affordable rates and train their clients on how better to manage their loans. In addition, strengthening and capitalizing farmer groups would help farmers raise enough money to fund agricultural improvements. Therefore, the government and other support organizations should promote the VSLA model of financing chain players.

Mwesigye .F et al (2016) proposed that there is need to strengthen and formalize the informal lending schemes so as to facilitate their loan recovery efforts, and together with development partners should capitalize them so that they are able to meet size of loans demanded by farmers.

FAO (2019) farmers' cooperatives that are supposed to stimulate dynamism in the industry remain rather weak in terms of organization levels and financial capacity. This lack of organization has strong repercussions on the capacity of processors and producers to access long-term financing from Financial Institutions (FIs) that they would need to upgrade their business. In Uganda, formal Financial Institutions did recognize the notable potential of investing in the potato value chain, but they still eschewed lending to smallholders and SMEs, focusing exclusively on providing credit to large agribusinesses and buyers. These actors have an easier time complying with the requirements set by FIs to access credit, and they can benefit from more regular income flows than producers and processors (FAO, 2017b).

Mbowa. S et al (2016) in Western Uganda, provide a deeper analysis of factors that discouraged Irish Potato farmers from using the relatively cheaper funding opportunities available from formal financial institutions revealed that include (i) a lack of collateral (usually land), and (ii) fear of losing collateral to creditors. Other factors cited include long loan processes and difficulty in making prompt repayment, especially when the payback period does not match the harvest

time. However, constraints on access are partially attributable to the location of formal financial institutions such as commercial banks in urban areas, which excludes many rural farmers. The likely consequence of limited access to agricultural financing relates to technology adoption.

According to Mbowe S et al (2016) in Western Uganda, Credit is necessary to finance investments in Irish Potato processing. To expand access to that credit, there is a need to sensitize value chain actors about the possibility of obtaining relatively affordable loans from commercial banks and MFIs, commercial banks should match the loan repayment periods with crop harvest times, and the government should capitalize the lines of credit that are easily accessed by different actors in the value chain, such as VSLAs.

FAO (2019) suggest rural actors in R&T value chains are usually not able to satisfy the requirements to access credit and savings services that are normally set by formal FIs. Often, these requirements imply having: conventional forms of guarantees (e.g. titled land, fixed assets); various forms of official identity documents (IDs); a high rate of compulsory savings; a guarantor willing to vouch for the loan applicant; and more. Rural producers and processors rarely meet even one of these criteria. In addition, the geographical fragmentation of Roots & Tuber value chain actors in rural areas increases the costs and challenges for FIs to reach them with their financial offer, as well as to manage their agricultural portfolios and the associated risks. This is compounded by the weakness of most FIs' banking infrastructure in rural areas, which forces rural actors to undertake long and potentially unsafe travels to reach the nearest FI's branch to access financial services.

The lack of insurance products available for producers and processors is an additional determinant of the lack of provision of credit and savings services to these segments of the chain.

4.6 Transport infrastructure and transport costs

A study by Kyomugisha H. et al (2018) in the major potato growing districts of Uganda stated that transportation of potato to the market accounted for the highest value addition cost incurred by farmers. This was attributed to the terrain of the area that is mountainous and not easily accessed by motorists. This is in agreement with FAOSTAT 2012; Bonabana et al, 2013; Sebatta *et al*, 2014 that found out that the Ugandan highlands are the main production areas of Kigezi, Rwenzori, Ankole, Nebbi, Mbale, Kapchorwa, and Bugisu. Farmers who added value were those nearer to markets.

Sebatta et al 2017 indicate also that distance to the nearest market positively and significantly influence smallholder farmers' decision to add value to ware potato before selling it. This may be against much of the available literature that has suggested that farmers who are far from markets are less likely to invest in such activities like adding value to agricultural products. Seed potato value addition takes a long time though with low inputs, the main ones being labour and space. Post-harvest value addition to this special product was affected significantly and negatively by distance to the market at 1% level. This is because germinated seed potato is a delicate product that is not easily movable over long distances. Many of the farmers who add value to seed sell it to their nearest peers in the nearest villages. This is a case of creating a local niche market that facilitates farmers' creation of business relations with local and specialised buyers Coltrain D. et al (2000).

A study by Horton et al., (2010) in Uganda stated another important constraint facing potato value addition and marketing in Uganda as transport infrastructure and costs. Ferris et al., (2001) stated that road infrastructure and transport availability have an influence on smallholder market participation, especially those that reside far from the consumption centres. In their study, Nyunza and Mwakaje, (2012) said majority of villages in potato producing areas of Uganda are served by an inadequate and poorly maintained road network. Given that transport generally marks the passage from one stage of the post-harvest system to the next, the poor state of road in rural areas make it difficult for smallholders to move produce from one stage to another (Horton et al., 2010). Such transport bottlenecks lock out farmers from value addition and participating in market opportunities.

Mbowa. S et al (2016) in Western Uganda cited a challenge of poor roads, especially during the rainy season. This problem arises because most of the feeder roads are seasonal and lack bridges; when it rains, they become impassable. To reduce on transportation costs, collective action including group marketing would be a remedy for cost sharing to reduce marketing costs and increase their bargaining market power.

4.7 Limited access to marketing information, services, technology and capital

Potato farmers receive market information from traders and fellow farmers. Traders provide farmers with market information on market prices and performance of different potato varieties on the market. Conversely, fellow farmers give information on farm level performance of new varieties, production technologies, and new markets in the area. However, the underlying trust issues between farmers and traders continue to undermine the extent to which this information is trusted and used across potato producers (Tatwangire A. et al 2017).

According to Mukhwana D et al (2015), the main sources of market information on price and markets include friends, fellow farmers, local leaders and occasionally the radios. The chain between producers and consumers is long with minimal value addition ensured. Farmers have difficulties in accessing market information, exposing them to a marketing disadvantage. To the extent that the cost of production and marketing is very high, value chain actors will register low returns, and will further be deprived of meaningful profits (Tatwangire A. et al 2017). Smallholder farmers normally rely on informal networks (traders, friends and relatives) for market information as a result of weak public information systems in Uganda (FAO, 2012). However, such individuals may not have up to date and reliable market information, making the usefulness of the information doubtful. Additionally, farmers relying on informal networks for market information are at risk of getting biased information due to opportunistic behavior of the more informed group. For instance, FAO, (2014) explained that smallholders in Uganda usually accept low prices for their crops when the broker informs them that their produce is of poor quality. Smallholder farmers accept these low prices mainly because they are unable to negotiate from a well-informed position. Failure to access timely market information increase transaction costs, reduce the quality and volume of marketed production, and further limits market performance along the ware potato value chains (Birachi et al., 2013; Tatwangire A. et al 2017).

Consumers need standardized products, yet these farmers and other players have little knowledge of consumers demand and hence cannot produce what the market needs. Even if they produce what the market needs, they may have little information of reliable and profitable markets. In

such circumstances, there is potential exploitation of farmers by the middlemen and wholesalers in the chain because the market value of the potatoes is subject to very limited negotiation, given that almost all farmers sell to middlemen at the farm gate. The exploitation is further exacerbated by absence of standardized packing and weighing scales (Chigusiwa et al., 2013). The growing demand for potatoes in urban areas could therefore contribute positively to the development of the rural areas and the overall economy of Uganda if there is 2 way efficient flow of market information.

Kyomugisha et al. (2012) reveals that potato market chain in Uganda is characterized by a large number of small uncoordinated farmers and buyers who face high marketing costs resulting into lack of mutually beneficial linkages between the various actors in the chain. The study observes that engaging in collective marketing, negotiating contracts, and selling good quality potatoes under some form of a contract improves market efficiency and profits attained by values chain actors.

In a study conducted in South-Western Uganda, Bonabana-Wabbi et al. (2013) identifies marketing channels of potatoes from the farm to consumption, identifies marketing constraints faced by farmers and traders in the potato marketing chain, and assesses the marketing performance of potato markets, and different potato varieties using gross margin analysis. The findings of this study underscore the need to carefully respond to institutional and product-related constraints that appear to inhibit the development of the potato value chains. In particular, the low prices at the time of sell, high perishability of the product, and poor market access as a result of bad road conditions and high transport costs are some of the factors that were found to inhibit market performance. Ultimately, these findings justify the need to promote the adoption of effective and affordable postharvest handling practices and storage techniques if value chain actors are to succeed in curbing price fluctuations due to seasonal production

4.8 Lack of storage infrastructure

Escobal and Cavero (2012) argued that lack of storage infrastructure in production and marketing areas limits most producers and other key players from participating in potato value chain. Most smallholder farmers do not have access to adequate storage infrastructure and end up selling their produce soon after harvest, also because they need the money involved. Smallholder farmers often rely on open-air storage (FAO, 2011). Due to lack of storage facilities, most smallholder producers are keen to sell produce almost immediately after harvest in order to ease congestion, leading them to sell their produce at lower prices (Kyomugisha et al., 2012). According to Kato, (2015), the ability to deliver a quality product to the market and ultimately to the consumer, commands buyer attention and gives the grower a competitive edge. Proper post-harvest handling and storage contribute in ensuring quality maintenance for perishable agricultural produce. Moreover, potato has to be harvested at a specific point in time, but are consumed year-round, thus necessitating proper storage facilities (Kato, 2015). Therefore, if the crop is to be available for consumption throughout the year, proper storage facilities have to be implemented by both farmers and traders. Amongst farmers, storage may have some added advantages because it increases market flexibility. Households with proper storage facilities do not need to market their produce immediately after harvest when prices tend to be low. They need store their produce and sell when prices are higher.

Mbowa. S et al (2016) in Western Uganda discovered a challenge of poor quality of storage facilities intended to safely store Irish Potato and prevent it from rotting. Irish Potato is a highly perishable crop and is sensitive to temperature changes. Damage and rottenness was primarily an outcome of poor storage facilities with poor ventilation, the use of inappropriate transportation methods, and poor post-harvest handling. These issues result in damaged and rotten Irish Potatoes. This suggests that investments in improved Irish Potato storage are crucial in upgrading the quality of ware Irish Potato sold which in turn translates into better prices. The study assembles some evidence to show that a relatively large (63%) number of processors experience shortages in the Irish Potato supply during the off-season. This has implications for the general stability of the operations of the value addition component of the value chain, which itself has implications for the objective of up-grading the Irish Potato value chain in the Kigezi sub-region. Shortages in the ware Irish Potato supply stifle business operations that perform the trade function in the Irish Potato value chain. There is a great need to expand capacity for storage infrastructure so that ware Irish Potato can be safely stored during the peak season and sold during the off-season. This would not only smooth the supply of Irish Potato but also curtail price fluctuations that hurt farmers. Because of the poor storage facilities, prices sharply fall during the harvest and increase during the off season. This issue affects farmers, most of whom sell after harvest.

4.9 Limited market access

Despite the seemingly developed and perfectly competitive potato value chain, smallholder farmers continue to complain of limited market access in terms of low prices, limited outlets, and hence low net returns (Kyomugisha et al., 2012). The problem of limited market access has been associated with inefficiencies along the market chain that starts from the farmer to the final consumer (Mbowa & Mwesigye, 2015). However, the level of inefficiency and the node at which the inefficiency is high is not empirically known; and given the different actors in the potato market chain and different market channel options from which a farmer has to choose, it is imperative to understand the level of inefficiency in order to recommend alternative value chain options the farmers could choose for improved gains from potato.

Sebatta C. et al (2014), the authors caution that to access these markets requires significant upgrading of produce in terms of quality, quantity and business management, which as are a function of value addition have to be undertaken. Through sorting and grading of the potato from their gardens, smallholder farmers are able to get two products, that is ware or table potato and seed potato for propagation in the following season both of which are commercial products. Kyomugisha.H, Sebatta .C, Mugisha J; 2018 in their study in major potato growing districts of Uganda found out that contract farming positively and significantly influenced market access in terms of potato volumes sold to the market. Growing preferred varieties (Rwangume, Kinigi and Victoria) promoted marketed volumes because they command a high market share due to their use in chips making in urban centres. According to Mukhwana D et al (2015), the marketing of potatoes is not controlled and because there is no large scale processing of the crop, large quantities of the crop have to be disposed-off in a short period of time leading to low prices which can be a disincentive to farmers.

According to FAO (2015), in marketing of potatoes, transactions are still dominated by spot markets and participants in the ware potato chains operate individually. Marketing constraints include: lack of standards and premiums, highly seasonal supply, crop perishability, lack of co-operatives, limited market information, unscrupulous traders, limited processing technologies and industries, poor access roads, and inadequate working capital. Profitability varies by type of trader, location, and variety handled.

Smallholder farmers are usually served by poor market infrastructure. These conditions are not conducive for fresh produce, contributing to perishability and loss of produce. Additionally, produce sold under poor market conditions does not only attract consumers but equally puts farmers at risk of losing customers. In his study in Uganda Bagamba, (2007) revealed that fresh produce tends to have a limited shelf life, therefore, may not be stored for long periods. This implies that such produce needs to be processed or to be sold while it is still fresh. When selling them, it is important to be cautious of market place conditions to keep them fresh. Market infrastructure such as sheds and stalls in spot markets are crucial in maintaining freshness of agricultural produce.

However, FAO (2017) suggest that it is generally insufficient to supply farmers with market information alone. Shepherd (2011) argues that farmers require assistance with interpreting this information and provides training for extension workers to supply such advice. The areas identified for support include helping farmers to understand why prices change, such as by developing an understanding of supply and demand. The prices broadcast on the radio or sent to farmers by cell phone rarely originate from the markets to which they have access.

4.10 Poor organization of the sector

Poor sector organization right away from production to final consumption acts as a setback to potato value addition in Uganda as cited by MAAIF, (2012). Like in many others countries, Uganda's Irish potato sub-sector is not well organized hence producers, transporters, and marketers are fragmented and tend not to cooperate (Kabale district, 2016). This lack of organization is one of the probable factors that isolate the sector from regional or global markets. This sort of disintegrated functioning of the local value chain has had a negative impact on growth in the overall agricultural sector. For example, the National Planning Authority (NPA), which is tasked with coordinating all of Uganda's sector-strategic development plans in the country's first (2010-2015) National Development Plan (NDP), cited weak value chain linkages from production to processing to marketing.

According to Birachi et al. (2013), VC actors have the potential to benefit from better markets when they choose to among others: operate within organized groups that encourage collective marketing in a timely manner, adopt some value-adding activities, and engage in processing of potato products to prevent postharvest losses. This calls for the deliberate effort to embrace collective marketing, appropriate postharvest handling practices, strong leadership within organized groups of VC actors, and continuous learning of new skills and innovations, all of which help to increase and maintain supply of high quality ware potato throughout the year (Tatwangire A et al 2017).

According to Sebatta C. et al (2017), the levels of farmer cooperation in the study area were found to be very low with 72.1% and 81.7% of the farmers in Kabale and Mbale respectively not belonging to any farmer's group or cooperative. This result has implications for increased production and access to knowledge as well as markets because literature shows that smallholder farmers who cooperate usually have better access to markets and other services.

Mbowa. S et al (2016) in Western Uganda, reported a high Level of informality in the Irish Potato processing Business. Access to Irish Potato for processing and purchasing ware Irish Potato remains informal, with no contractual arrangement. Where contracts exist, the agreements are verbal and largely informal. This finding suggests that the Irish Potato industry remains informal and relies on trust instead of binding formal agreements.

To address this challenge, farmer groups and group marketing must be strengthened. In addition, improving farmer storage facilities would enable farmers to collect and store Irish Potato, which in turn would support group marketing. These changes would improve farmers' bargaining power, which translates into better prices.

4.11 Access to extension services

Access to extension services on the other hand had a positive and significant effect on the smallholder farmer's decision to add value to seed potato Sebatta C (2017). This is because contact with the extension agents is a means of transfer of knowledge on how and which insecticides to apply in addition to giving market information to the farmers. Extension officers also play a vital role in advising the farmers on the varieties and sizes that are on demand as well as location of buyers due to their capacity to move around bigger geographical areas and ability to read market signals. Access to extension services was found to be a key determinant of smallholder farmers' decision to add value to potato especially seed potato. This is because adding value to seed potato requires special skills that can only be acquired through training by qualified extension agents. Therefore increased extension outreach would be a recommendable intervention if household incomes of the highland farmers.

Mbowa. S et al (2016) in Western Uganda discovered that the most important processed Irish Potato products are chips, with a small component of crisps. Making crisps is more technology intensive and requires more skills than making chips. The study reveals that most small-scale processors are not trained and cannot afford the requisite technology required to make crisps.

4.12 Lack of proper policies related to smallholder farmers

Legal institutions influence the activities performed on the market and the costs of exchange. Mugisha et al., (2010) affirmed that the formal institutional development of a society has a considerable influence on transaction costs. Effective legal institutions improve the organization of the marketing channels and decrease marketing costs (Mwangi et al., 2013). In Uganda, laws are not always executed and enforced correctly, bribery and cheating are often not penalized, courts are out of reach for the majority of the population, and market rules are often not transparent to the producers and traders (Escobal and Caverro, 2012). It is even worse for the smallholder farmers because they lack lobbies in the legal environment. As a result, rural trade

prospers where trust has been developed based on repeated transactions or informal relationships. This unfavorable legal environment has created a significant barrier to entry into formal potato trade and limits participation by smallholders in the marketing system (NAADS, 2015). Kasirye (2015) reported several challenges of tax exemptions for the agriculture sector. Notably, first, tax exemptions do not translate into preferential interest rates for borrowers in the agricultural value chain. Second, despite the zero rating of VAT on seeds, fertilisers and pesticides, uptake by farmers remains very low due to existence of counterfeits, the high cost of technologies, and limited knowledge, among others.

Nyunza and Mwakaje, (2012) postulated that the agricultural marketing policy of Uganda is characterized by government support and controls. These policies and incentives are influential and important in mobilizing the farmers for value chain participation. For instance, commercial farmers who receive support from government policies enjoy the legacy of the policy because they gain access to markets. However, smallholder farmers do not have access to the levels of state assistance and market share, which the government guarantees to commercial farmers. Thus smallholder and emerging farmers have to gain and compete for a market share on their own. Since these farmers are still learning, they face difficulties in competing in well-developed markets. This situation calls for a need of the government to create an enabling market environment for the smallholder farmers through selective financial government support, reduction in anti-competitive behavior and facilitating private sector and farmer organizations partnerships. In addition, the government can ensure that public facilities, such as information and infrastructural facilities are developed in areas where smallholder and emerging reside, for their benefit (Mugisha and Katwijukye, 2010).

Currently, the government of Uganda has made steps towards promoting value addition of agricultural products and this is evidenced in the various policies put in place. The agricultural sector in Uganda is organized into various wider programmes of: production and productivity; market access and value addition; creating an enabling environment, and; institutional strengthening (MAAIF, 2010). By 2040, Uganda expects to have realized its vision of a transformed economy, where commercialization of agriculture and urbanization are two key processes contributing to raised productivity and transformation. Achieving these two processes requires among others a better access to agricultural markets; inclusive value addition, including storage; an enabling environment, and; strong institutions of farmers and other value chain actors. All these policies recognize the role of smallholder agriculture in transforming agricultural sector in the country (Uganda Vision 2040). There is commitment to promote private sector investment (based on the private sector led strategy) in agriculture to: increase production and productivity; improve access to markets of agricultural products; expand exports; eradicate income poverty through value addition and integration, strengthening institutions in the sector, and ensuring sustainable economic growth and development(MFPED,2015)

5.CONCLUSION AND RECOMMENDATION

Potato production, marketing and value addition is primarily supported by numerous chain players: agro-input dealers, seed multipliers, farmers/producers, marketers (agents and traders), and processors. Farmers, traders and processors are the most influential actors in determining volume and quality of traded potato, per capita value added product and price outcomes in the Irish Potato subsector. Although there has been progress in boosting per capita value added

product at various levels of the potato value chain, players were still restrained by institutional setbacks like; un-reliable supply of quality seed inputs, fertilizer and pesticide, limited access to credit services, transport infrastructure and transport costs, limited access to market information, services, and technology, lack of storage infrastructure, limited market access, poor market infrastructure, poor organization of the sector, poor legal environment and lack of proper policies related to smallholder farmers. The constraints must be addressed for Uganda to optimally exploit its full potato production potential and upgrade its entire value chain.

Modalities to build the capacity of the agro-input dealerships with ownership embedded within potato farming communities must be instituted to supply adequate amounts of quality requisite seed inputs for production. This can be operationalized through promoting of group savings schemes that can purchase quality guaranteed seed inputs in bulk. Such saving schemes can be turned into potato production Savings and Credit Cooperative Societies (SACCOs) to extend financial services to farmers at relatively low interest rates.

To address the challenge of limited seed potato supply, government and the private sector should build the capacity at seed production and multiplication by taking the following actions; expanding KAZARDI's production capacity for basic seed potatoes; intensifying the decentralization of seed multiplication by replicating the efforts of the International Fertilizer Development Centre (IFDC) by constructing screen houses that could enable more farmers in all the producing areas to become foundation potato seed multipliers. Priority should be given to the production of marketable potato varieties Kinigi, Rwangume and Victoria and other varieties that are high-yield, rapidly maturing, disease resistant, and able to support industrial-scale processing businesses.

Formal financial institutions should leverage on both high capitalization and the relatively low interest rates to design credit packages for agricultural commodity value chain actors with shorter loan-application processes. Such credit packages need to match the loan-repayment periods with crop harvest times, which will alleviate farmers' concern about the difficulty of servicing loans before the harvest and their potential failure to satisfy their obligation of timely loan repayment.

The government and the private sector can channel credit facilities through existing farmer groups to increase access to credit through either capitalizing farmer group-level VSLAs or lending to farmer groups instead of individuals. The high level of cohesion within a group offers an incentive for loan repayment because the group exerts social pressure on potential defaulters to enforce loan repayment.

The government and the private sector should support the construction of farmer-managed and -controlled storage facilities to promote a sense of ownership. This will help address the issue of price fluctuations and seasonality at the marketing and processing levels.

There is a need to upgrade infrastructure and more importantly, community and market stores that support the functionality of the traders who are the key actors throughout the Irish Potato value chain. Therefore, the area of focus in upgrading and adding value to ware Irish Potato traded in the zonal investment plan (ZIP) should focus on the following three aspects: (1) quality enhancement in terms of size, variety and maturity; (2) proper handling of Irish Potatoes to

reduce damage by supporting investments in building stores; and (3) increased seed multiplication of tradable varieties, for example, *Kinigi*, *Rwangume*, and *Rwashaki*.

There is a great deal of opportunity and value lost given the low level of processing in the Irish Potato sub-sector; this situation is primarily attributed to the lack of appropriate Irish Potato varieties. This gap needs to be plugged through increased research and development to quickly identify suitable Irish Potato varieties that conform to both farmers' selection criteria and industrial processors' business needs.

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