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Research Article

The Effect of Irish Potato (*Solanum Tuberosum*) Postharvest Handling Technologies on Reducing Post-Harvest Losses and Improving Food Security in Chahafi Town Council, Kisoro District

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Abstract

The study focused on investigating effect of Irish potato post-harvest handling technologies on reducing losses and improving food security in Chahafi Town council, Kisoro district. It was limited to; identifying the factors influencing the use of post-harvest handling technologies by Irish potato farmers. The study employed a cross-sectional research design and primary data was collected from 231 respondents through use of questionnaire and interview guide. The data was analysed using SPSS version 22.0. The study concludes that factors influence the adoption and use of post-harvest handling technologies among Irish potato farmers. These include; *Government policy* (p = 0.012), *extension training services* (p = 0.001), *Market Access* (p = 0.018), *level of education* (p = 0.045) *access to advanced technology* (p = 0.001), *access to credit facilities* (p = 0.003), *farmers' attitude and perception* (p = 0.004), *knowledge and awareness* (, p = 0.000). The study recommends that; *there is a need increase the presence of well-trained extension agents* in Chahafi Town Council to provide regular technical support and demonstrations. *There is a need to strengthen local farmer cooperatives and SACCOs* to offer affordable credit tailored for post-harvest investments. There is a need to ensure *support access to proper packaging materials* like ventilated crates and durable bags.

Keywords

Post-Harvest Handling Technologies, Food Security, Chahafi Town Council, Kisoro District

1. Introduction

At the global scale, the impact of post-harvest handling technologies on food security among Irish potato farmers is significant through extending product shelf life [10]. Irish potatoes (*Solanum tuberosum*) are one of the world's most important food crops, with production occurring across diverse regions and climates [6]. However, despite their importance, post-harvest losses pose a significant challenge to food security and economic sustainability globally. Post-harvest losses occur at various stages of the potato value chain, including harvesting, storage, transportation, and marketing [10]. These losses are primarily due to factors such as inadequate infrastructure, poor handling practices, and lack

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of access to appropriate technologies [8]. Post-harvest losses of perishable crops, including potatoes, contribute to food insecurity by reducing the availability of nutritious food for consumption [7].

Post-harvest losses of Irish potatoes pose a significant challenge to food security, impacting various countries across different regions [3]. For instance, in Europe, potatoes are a staple crop, and post-harvest losses affect countries like Germany, France, and the United Kingdom. In Germany, where potatoes are a key component of the diet, post-harvest losses due to inadequate storage facilities and handling practices have been reported [8]. Adoption of effective post-harvest handling technologies is crucial for reducing losses and improving food security among potato farmers worldwide. Improved storage facilities, such as cold storage units and warehouses, help extend the shelf life of Irish potatoes and prevent spoilage due to pests and diseases [8]. Transportation technologies, such as refrigerated trucks and containers, ensure that potatoes reach markets in optimal condition, reducing losses during transit [8].

In Sub-Saharan Africa, post-harvest losses of Irish potatoes are a critical issue that affects food security, economic sustainability, and livelihoods across various countries in the region [22]. Several factors contribute to these losses, including inadequate infrastructure, poor handling practices, pests, diseases, and limited access to modern storage and transportation facilities [5, 9]. Irish potatoes are a vital food crop and a significant source of income for smallholder farmers in Kenya [5]. However, post-harvest losses are a major challenge, with estimates suggesting that up to 30% of harvested potatoes are lost due to poor handling practices, lack of storage facilities, and limited access to markets [6]. For example, farmers often store potatoes in makeshift structures or traditional storage pits, which are prone to spoilage and rot. Initiatives such as the Kenya Climate-Smart Agriculture Project have been working to address these challenges by promoting improved storage methods, capacity-building initiatives for farmers, and market linkages to reduce post-harvest losses and enhance food security [5].

In Uganda, losses during post-harvest occur at very many steps of the potato value chain including harvesting, storage, transportation, and marketing [22]. Traditional storage methods such as storing irish potatoes in pits or on the ground are common among smallholder farmers due to limited access to modern storage facilities [12]. However, these methods often result in spoilage and deterioration in quality due to exposure to moisture, pests, and diseases. Additionally, poor handling practices during harvesting, sorting, and packaging contribute to losses, as bruising and physical damage increase susceptibility to decay. The impact of post-harvest losses on food security in Uganda is profound, particularly for smallholder farmers who rely on potatoes as a staple food and a source of income [19]. High losses reduce the availability of nutritious food for consumption and diminish farmers' incomes, limiting their ability to invest in agricultural production and other essential needs [15]. Moreover, at the national level, post-harvest losses contribute to market instability, food shortages, and increased prices, affecting food access for vulnerable populations [12].

Kisoro District, located in the southwestern region, Uganda, is key potato-producing area. Post-harvest losses are prevalent due to inadequate storage facilities and pest infestations, particularly from potato weevils [12]. Farmers struggle to preserve their harvests, leading to reduced marketable yields and economic losses. Efforts by local agricultural offices and other government organizations focus on educating farmers on integrated pest management techniques and promoting the use of improved storage technologies, such as hermetic bags, to minimize post-harvest losses and enhance food security [12].

2. Problem Statement

In an ideal scenario, Uganda's irish potato value chain would be characterized by efficient post-harvest handling practices, modern storage facilities, and effective market linkages. Smallholder farmers would have access to appropriate technologies and knowledge to minimize losses and optimize the value of their produce. Reduced post-harvest losses would result in improved food security, increased incomes for farmers, and enhanced market stability.

However, the reality in Uganda's potato sector paints a different picture. Smallholder farmers often lack access to proper storage facilities, relying instead on traditional methods such as pit storage, which are prone to spoilage and deterioration [20]. Poor handling practices during harvesting, sorting, and packaging further exacerbate losses. Limited market access and infrastructure challenges hinder farmers' ability to sell their produce at competitive prices, leading to economic losses and food insecurity. Addressing post-harvest losses in Uganda's potato sector is essential for enhancing food security outcomes. Implementing effective post-harvest handling practices, improving storage infrastructure, and enhancing market linkages can lead to significant improvements in the sector [20]. The expected outcome includes reduced post-harvest losses, increased incomes for smallholder farmers, improved food security for households, and enhanced market stability.

Despite the recognition of post-harvest losses as a critical issue in Uganda's potato sector, there is a notable research gap in understanding the effectiveness of interventions aimed at reducing losses and improving food security. Existing studies often focus on descriptive analyses of the problem without evaluating the impact of specific interventions or identifying best practices [2]. Therefore, there was a need for research that assesses the effectiveness of different post-harvest handling technologies, storage methods, and market linkages in mitigating losses and enhancing food security outcomes for smallholder farmers.

3. Research Objectives

The general objective of the study was to; investigate effect of Irish potato post-harvest handling technologies on reducing losses and improving food security in Chahafi Town council, Kisoro district. The specific objective was to; examine the factors influencing the use of post-harvest handling technologies by Irish potato farmers in Chahafi Town council.

4. Significance of the Study

The results will significantly affect different categories of people who will include; irish potato farmers, community members, government and future researchers:

Farmers

For Irish potato farmers, the study's findings will be invaluable in several ways. Firstly, by identifying effective post-harvest handling technologies and practices, farmers can minimize losses and optimize the value of their produce. This can lead to increased incomes and improved livelihoods for farmers and their families. Additionally, understanding the factors influencing the adoption of these technologies can help farmers make informed decisions about investing in new practices. Ultimately, the study's insights can contribute to the sustainability and profitability of potato farming operations.

Government

The study holds significant implications for government stakeholders involved in agricultural policy and development. By identifying gaps and challenges in post-harvest management within the potato sector, policymakers can design targeted interventions to address these issues. Improving post-harvest handling practices can contribute to national food security goals by reducing losses and ensuring a more efficient utilization of agricultural resources. Additionally, enhancing the competitiveness of the potato value chain can have broader economic benefits, including job creation and increased agricultural productivity.

Community members

Community members, including consumers and local businesses, also stand to benefit from the study's findings. Reduced post-harvest losses mean a more consistent and affordable supply of Irish potatoes in local markets, improving access to nutritious food for households. Moreover, increased incomes among potato farmers can stimulate economic activity within communities, leading to improved living standards and greater social well-being. Additionally, community members involved in the agricultural value chain, such as traders and transporters, may benefit from more streamlined and efficient market operations resulting from improved post-harvest management practices.

Future researchers

The study serves as a foundation for future research endeavors in the field of post-harvest management and food security. Researchers can build upon the study's findings to explore specific aspects of post-harvest handling technologies, such as the environmental impacts of different practices or the socio-economic factors influencing adoption rates. Additionally, comparative studies across different regions or countries can provide valuable insights into the scalability and transferability of interventions. By expanding the body of knowledge in this area, future researchers can contribute to more informed decision-making and the development of innovative solutions to address post-harvest losses globally.

5. Materials and Methods

The study was conducted in Chahafi Town Council, Kisoro District. Chahafi, located in *Kisoro District* in the southwestern part of Uganda, is part of the *Kigezi highlands*, a region known for its favorable agricultural conditions, especially for Irish potato farming [17]. Neighboring districts include *Rubanda* to the northeast, *Kanungu* to the north, and international borders with *Rwanda* and the *Democratic Republic of Congo* to the south and west, respectively. This location supports cross-border trade of Irish potatoes, which is a significant economic activity [1].

The *climate* in Chahafi Town Council is characterized by a *cool tropical highland climate*, with temperatures ranging from *10℃ to 20℃*. The area experiences *annual rainfall* between *1000 mm and 1500 mm*, ideal for Irish potato farming, as potatoes thrive in cool and moist environments [14]. Consistent rainfall and moderate temperatures help reduce the risk of pests and diseases [13]. *Volcanic soils* in the area are rich in *nutrients* like phosphorus, potassium, and nitrogen, essential for *Irish potato cultivation* [11]. These well-drained soils support multiple growing seasons and reduce the risk of waterlogging, which can lead to crop diseases [18]. The *vegetation* consists mostly of grasslands and montane forests, with much of the natural land cleared for agricultural use, further supporting potato farming [14].

Chahafi Town Council's location, fertile soils, favorable climate, and strategic position for cross-border trade make it a significant hub for Irish potato production and a suitable area for studying post-harvest handling technologies [11, 17]. Chahafi town council was chosen because it is one of the leading Irish potato-producing zones in Kisoro District. Despite high production, farmers in Chahafi face significant *post-harvest losses* due to poor storage, handling, and transportation practices, making it a suitable location to study the impact of improved post-harvest technologies.

A descriptive-cross sectional *research design* was suitable. This design combined both quantitative and qualitative approaches, allowing for a comprehensive analysis of the research problem. The quantitative component involved data collection on study variable indicators, while qualitative component focused on understanding the factors influencing the adoption and effectiveness of handling technologies. Quantitative approach involved use of structured questionnaires to collect data from potato farmers regarding their post-harvest practices, types of technologies used, and reported losses. Qualitative approach

involved use of conduct semi-structured interviews with key informants (for example; agricultural extension workers and community leaders) to explore their experiences and knowledge about handling technologies.

The study population for the research on the effect of Irish potato post-harvest handling in reducing post-harvest loss and improving food security in Chahafi Town Council, Kisoro District, these included;

Farmers: Individuals involved in Irish potato cultivation within Chahafi Town Council, encompassing small-scale subsistence farmers to larger commercial operators.

Agricultural extension officers; Professionals working in the agricultural sector who provided advice, training, and support to farmers regarding best practices in cultivation, post-harvest handling, and marketing.

Community leaders; Local authorities and community representatives who can provide insights into community dynamics, challenges, and potential solutions related to Irish potato production and food security.

Sample size increases the statistical power of the study, allowing researcher to detect smaller effects or differences between groups. This enhanced the likelihood of finding significant associations or relationships between variables. The sample size was determined using [23] formula;

N = estimated population of irish potato farmers who apply post-harvest handling technologies (650), e = standard error = 5% (0.05), n is required sample size, N is population size, $(e)^2$ is marginal error.

$n= N/1+N\ (e)^2$

$n = 550/1+550\ (0.05)^2$

n = 230 respondents.

Purposive sampling: This was used to strategically select respondents who possess the most relevant knowledge and experience regarding Irish potato post-harvest handling technologies in *Chahafi Town Council, Kisoro District*. This non-probability sampling technique was chosen because it allowed the researcher to focus on specific individuals or groups with the expertise or involvement in post-harvest handling of Irish potatoes, which is crucial for addressing the study's objectives.

The approach ensured that the *sampled individuals have first-hand experience* with the technologies and provided insights into how they reduced losses and impact food security.

This selected *agricultural extension officers* who provided advice and training on post-harvest technologies to farmers. It also targeted community local leaders because they were key stakeholders during implementation of agricultural policies at community level.

Stratified sampling: This method was used to ensure that different categories of respondents, who were relevant to the study on the effect of Irish potato post-harvest handling technologies on reducing post-harvest losses and improving food security in *Chahafi Town Council, Kisoro District*, was properly represented. This technique involved dividing the population into *distinct strata (subgroups)* and then selecting a sample from each stratum. The goal was to make sure that each subgroup was adequately represented in the study to reflect the diversity of perspectives.

The population involved in Irish potato production and post-harvest handling in Chahafi Town Council was divided into *homogeneous subgroups* (strata) based on key characteristics relevant to the study, such as;

Farmers: this included small-scale, medium-scale, and large-scale Irish potato farmers, each of whom had different experiences with post-harvest technologies.

Extension officers: Agricultural officers responsible for advising farmers on how best they could use appropriate post-harvest handling practices.

Local leaders: Individuals who were involved in policy-making and monitoring post-harvest loss reduction efforts.

These strata was chosen to ensure that all important categories involved in the *post-harvest handling process* are represented. Once the strata was defined and the sample size for each was determined, the researcher used *random sampling within each stratum* to select respondents. This helped to avoid bias and ensures that every individual in a given stratum had an equal chance of being selected.

Questionnaires; These consisted of both *closed-ended and open-ended questions*. They were designed to capture quantitative data on the adoption and effectiveness of post-harvest handling technologies, as well as the perceived impact on post-harvest losses and food security. Questionnaires were deemed appropriate for this study because they allowed for the collection of data from a *large number of respondents* in a relatively short period, making them ideal for reaching farmers across Chahafi Town Council.

The use of closed-ended questions provided *quantitative data* that can be statistically analyzed to identify trends in the use of post-harvest technologies and their effectiveness in reducing losses.

Interview guide; *Semi-structured interviews* were conducted using interview guide on key informants such as agricultural extension officers and local leaders. The interview guide included both *pre-determined questions* and room for probing further based on responses. This method was flexible, allowing interviewers to adjust questions and delve deeper into areas of particular interest, based on the *expertise* of the respondents.

Quantitative data was analyzed using SPSS version 23.0 to establish descriptive and inferential statistics.

Descriptive statistics were used to provide a general overview of the data collected from respondents. For example, *frequencies and percentages* were used to describe the *proportion of respondents* using specific post-harvest handling technologies (e.g., improved storage facilities, transportation methods) and to quantify the extent of *post-harvest losses* before and after technology adoption. Descriptive statistics were also used to summarize data on *average post-harvest losses* and *average food security levels.*

Inferential statistics: this involved use statistical tests to examine relationships between variables. These variables

were post-harvest handling technologies, post-harvest losses, and food security levels. It was done to determine if the use of these technologies had a significant effect on reducing losses and improving food security.

Multiple regression analysis was used to determine how different factors (for example., use of storage facilities, transportation methods, drying techniques) impact *post-harvest losses* and how these losses, in turn, influenced *food security*. For example a regression model was set up where *post-harvest losses* were the dependent variable and *use of technologies (storage, handling, and transport)* are the independent variables.

A *content analysis* was conducted to handle qualitative data to identify *frequent words* and *key phrases* that respondents used when discussing post-harvest handling technologies and food security. For example, words like" "*storage*," or "*post harvest loss*", "food security", appeared frequently in discussions during interview. The frequency of key concepts helped determine the *importance* of certain issues or practices across the different groups of respondents.

6. Study Results

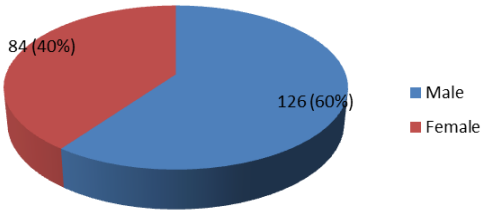

Figure 1. *Gender of respondents.*

Out of the 210 respondents, *126 (60%)* were *male* and *84 (40%)* were *female*. This shows that men are more than women who are involved in the study related to irish potato post-harvest handling. An implication that since both genders are significantly involved with a noticeable male dominance, post-harvest interventions should *target both men and women*, with a deliberate focus on *increasing women's participation* by addressing gender-specific constraints like access to technologies, land ownership, training opportunities and among others.

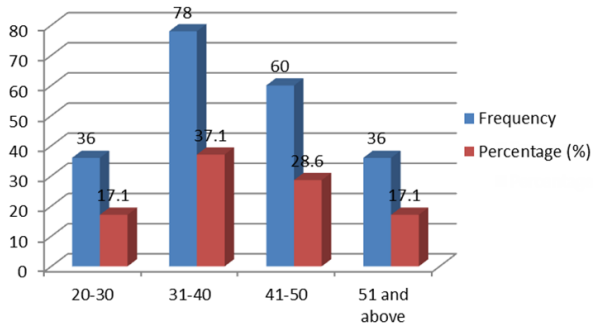

Figure 2. *Age group.*

The *majority (37.1%)* of respondents fall between *31–40 years*, a group typically considered to be in their productive and economically active years, followed by 41-50 (28.6%). Only *17.1%* are youth (20–30) and another *17.1%* are older adults (51+). Since most farmers are in the productive age group, they are *more likely to adopt and apply new post-harvest handling technologies*. The low youth participation suggests a need to *encourage youth engagement in agriculture*, especially through agribusiness approaches to make farming more attractive.

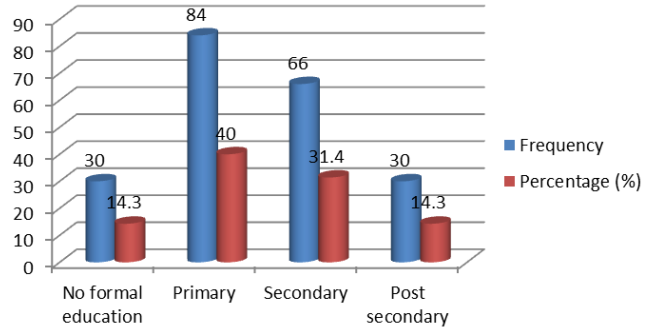

Figure 3. *Education level.*

A large portion (54.3%) of respondents have *primary or no formal education*, while only 14.3% attained *post-secondary education*. Secondary education accounts for 31.4%. This shows that *literacy levels are generally low*, which may limit *understanding and adoption of post-harvest technologies* that involve technical instructions. Extension workers must use *local language, visuals, and demonstrations* to effectively reach farmers and promote best practices.

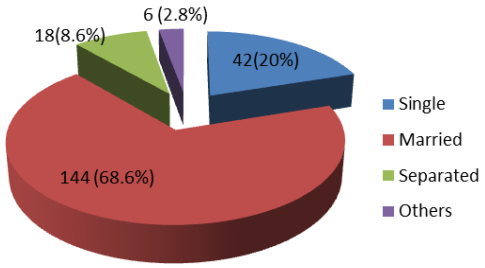

Figure 4. *Marital status of respondents.*

The study results in Figure 4 show that *68.6%* of respondents are *married*, followed by 20% single and 8.6% separated. Only 2.9% reported other marital statuses. This implies that married individuals often have larger households to support. Thus, improving post-harvest handling among them could significantly impact *household food availability, reduce waste, and ensure year-round nutrition*. Special attention could be given to *supporting family-based storage practices* and gender-inclusive training.

Table 1. *Regression output on factors influencing the use of post-harvest handling technologies by irish potato farmers.*

Variable	Coefficient (B)	Std. Error	t-test	p-value
Constant	1.120	0.311	3.60	0.000
Government policy	0.158	0.062	2.55	0.012
Extension training services	0.220	0.067	3.28	0.001
Market access	0.134	0.056	2.39	0.018
Level of education	0.089	0.044	2.02	0.045
Access to advanced technology	0.195	0.060	3.25	0.001
Access to credit facilities	0.172	0.058	2.97	0.003
Farmers' attitude/perception	0.203	0.070	2.90	0.004
Knowledge and awareness	0.242	0.065	3.72	0.000

Government Policy (B = 0.158, p = 0.012).

Statistically significant. A one-unit improvement in policy support increases tech use by 0.158 units. This implies that supportive policy frameworks enhance adoption of technologies.

Extension Training Services (B = 0.220, p = 0.001).

Highly significant. More training leads to better post-harvest handling practices. This implies that extension services are a key driver for awareness and usage.

Market Access (B = 0.134, p = 0.018).

The results show significant relationship. Farmers with better access to markets are more likely to adopt post-harvest technology.

An implication that access to better-paying markets creates an incentive to preserve quality through technology.

Level of education (B = 0.089, p = 0.045). The results show significant which means that educated farmers are more open to innovation. The results imply that literacy and education positively influence adoption behavior.

Access to advanced technology (B = 0.195, p = 0.001).

The results show strong and positive significant relationship between access to *advanced technology and use of patato post-harvest handling technologies.* Presence of technology makes it easier to adopt and use.

Access to credit facilities (B = 0.172, p = 0.003)

The results show that there is significant relationship between credit access and use of post-harvest handling technologies as this enables purchase of post-harvest tools and storage facilities.

Farmers' attitude and perception (B = 0.203, p = 0.004). The results show significant relationship. An implication that awareness campaigns should target behavior and beliefs.

Knowledge and awareness (B = 0.242, p = 0.000). The results show that this is most significant predictor. This implies that knowledge is power and that more informed farmers adopt quickly and use post-harvest handling technologies.

In an interview conducted with local council chairperson on how improved post-harvest handling practices influenced food security within the community, it was reported that,"*Families who preserve their harvest well have food for a longer period. They sell part and keep part for home consumption, reducing the hunger periods*".

Another interview was further held on what ways do technologies contribute to the economic well-being of Irish potato farmers, it was said that, "*By reducing losses and improving the quality of produce, farmers earn more from their sales. They also save money that would otherwise be used to replace spoilt potatoes*".

In another interview conducted with local leaders on how their local leadership collaborate with agricultural extension workers to promote effective post-harvest management practices, it was further said that "*We invite extension workers to community dialogues, radio talk shows, and village meetings. We also help in mobilizing farmers for demonstrations and trainings*".

In an interview held with one of the key informants on challenges farmers face in accessing and using modern post-harvest handling technologies, it was revealed that "*Cost is the biggest barrier. Most farmers can't afford cold storage or improved containers due to high costs associated to invest in such technologies. Additionally, some lack the technical know-how, and there are limited demonstrations or practical trainings*".

7. Discussion of Results

The study revealed that extension training services emerged as one of the strongest factors influencing the adoption of postharvest handling technologies (PHHTs), with a highly significant p-value (0.001). Extension officers act as

the primary link between technology, and the farmer. When farmers receive hands-on training in areas such as improved storage techniques, sorting and grading, and pest control, they gain the confidence and technical capacity to implement those practices. In Chahafi town council, where post-harvest losses are high due to traditional storage and handling methods, training can have an immediate impact. Demonstrations, on-farm trials, and follow-up visits help farmers internalize new knowledge and apply it in their daily operations. Thus, strengthening the extension system in Kisoro District is vital for sustained PHHT adoption. This study finding is in agreement with Chilinda et al., who reported that weak agricultural extension services in many African countries limit farmers' knowledge about the benefits of using post-harvest technologies [4]. Chilinda et al., whose study was carried out in in Malawi, explained that farmers often lack access to trained extension officers who can provide guidance on adopting such improved technologies [4].

Respondents also established that market access is a critical factor for technology adoption, and its positive influence is statistically significant in this study. Farmers are more inclined to adopt post-harvest handling technologies when they are assured of stable, and accessible markets. Access to local and institutional buyers increases the motivation to preserve product quality and reduce spoilage. In Chahafi Town Council, poor road networks hinder farmers from reaching distant markets, which discourages investment in post-harvest technologies. Facilitating market access through infrastructure development, contract farming, and improved information flow would incentivize farmers to adopt better handling practices and improve income stability. This finding can be compared with [21], which argued that strict quality standards in developed countries incentivize farmers to adopt post-harvest technologies to meet consumer and regulatory expectations.

The study respondents also said that access to advanced technologies, such as improved storage structures, solar dryers, mechanized sorting tools, and cold storage systems, strongly influences the uptake of post-harvest handling technologies (PHHTs). The availability and affordability of such technologies determine whether farmers can shift from traditional methods to more efficient systems. In many rural parts of Kisoro, including Chahafi, post-harvest losses are changed by limited access to modern technologies. When such tools are available either through public programs, farmer cooperatives, or NGOs, farmers are more likely to adopt them. Facilitating community-level access or cooperative-owned post-harvest tools could reduce costs and expand usage. This study finding concurs with [16] who in their study reported that farmers in developed nations have access to sophisticated technologies, including mechanized harvesting, climate-controlled storage facilities, and automated sorting systems. [16] explained that access is facilitated by well-established agricultural infrastructure and robust extension services.

The study results established that government policy plays a pivotal role in shaping the environment within which post-harvest handling technologies are accessed and utilized. A positive and statistically significant coefficient indicates that favorable government policies such as agricultural subsidies, infrastructure support, significantly influence the adoption of PHHTs. For example, when the government provides subsidies for storage facilities or offers tax exemptions on post-harvest equipment, farmers are more likely to adopt these innovations. Additionally, supportive policies that ensure access to inputs, market protection, and extension services create a conducive environment for smallholder farmers to invest in post-harvest improvements. This finding is in line with [5] in many developed nations which emphasised that government policies offer incentives, including subsidies and tax breaks, to farmers investing in post-harvest technologies. For example, the European Union has allocated funds for innovation in agricultural practices under the Common Agricultural Policy (CAP), leading to widespread adoption of technologies.

The results revealed that knowledge and awareness of post-harvest handling techniques and their benefits had the *strongest positive influence* on adoption and use of the post-harvest handling. This means that awareness is fundamental to the adoption of PHHTs. Without basic knowledge of what causes post-harvest losses and how specific technologies can mitigate them, adoption is unlikely to occur. Awareness also empowers farmers to seek out support, ask relevant questions, and adopt best practices. In Chahafi Town council, widespread awareness campaigns through radio programs, local meetings, and farmer-to-farmer training could drive a significant increase in PHHT usage. This study finding is in agreement with [12], this report emphasise that many farmers in Uganda lack knowledge about post-harvest handling technologies. However, the Ministry of Agriculture, Animal Industry, and Fisheries (MAAIF) has implemented initiatives aimed at promoting these technologies among smallholder farmers.

8. Conclusion

The study concludes that factors influence the adoption and use of post-harvest handling technologies among Irish potato farmers. These include; *knowledge and awareness, extension training services*, and *access to advanced technologies which* are the strongest drivers unlike credit access, government policy, market access, education, and farmer perceptions which are secondary factors.

9. Recommendations

There is a need increase the presence of well-trained extension agents in Chahafi Town Council to provide regular technical support and demonstrations.

There is a need to strengthen local farmer cooperatives and SACCOs to offer affordable credit tailored for post-harvest investments.

Enhance rural infrastructure and market linkages to provide incentives for quality preservation and reduce post-harvest losses.

Promote adult education and farmer field schools that integrate literacy with agricultural training to overcome education-related adoption barriers.

There is a need to ensure *support access to proper packaging materials* like ventilated crates and durable bags.

There is also a need to *increase farmer awareness and adoption of curing practices* through extension services and demonstration plots.

Abbreviations

CAP	Common Agricultural Policy
FAO	Food Agriculture and Organisation
KCSAP	Kenya Climate-Smart Agriculture Project
MAAIF	Ministry of Agriculture, Animal, Industry and Fisheries
NAADs	National Agriculture, Advisory Services
NGO's	Non-Governmental Organisations
PHHTs	Post Harvest Handling Technologies
SACCOs	Savings and Credit Cooperative Society
SPSS	Statistical Package for Social Sciences
WFP	World Food Programme

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Conflicts of Interest

The authors declare no conflicts of interest.

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