

## **Influence of a Shared Learning Platform on Participation in Seed Potato Multiplication among Small Scale Farmers in Kamara Ward**

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### **Abstract**

Food security remains a challenge in Sub Saharan Africa and has been attributed to several factors among them, low productivity of agricultural resources. Investment in agricultural research and technology are required to bring about change in food security. Innovation platforms have been used as vehicles in agricultural research for development. Potato (*solanum tuberosum*) is a staple food second after maize in Nakuru County. Although potato is predominantly grown by small scale farmers, they have limited access to quality seed potato. They are not participating in seed potato multiplication due to limited knowledge and skills and their farms are below the minimum requirement of 5 acres by KEPHIS. The research was designed as a descriptive survey using participatory action research methodologies in which baseline data was collected and analyzed then an intervention done. An end line survey was done data collected and analyzed again. The target population consisted of all small - scale potato farmers and all key informants in the seed potato value chain in Nakuru County The accessible population was potato small scale farmers from Kamara Ward Kuresoi North Sub County Kenya. The Key Informants (KI) were from Kuresoi North and Molo Sub Counties of Kenya. Purposive sampling was used to select 120 small scale potato farmers from Kamara Ward, 10 key informants for the baseline survey. Forty small scale farmers were purposively selected from those who participated in the baseline survey for the action plan (SLP). Data was collected on the farmer's knowledge and skills on seed potato multiplication before, during and after the intervention. Statistics Data Analysis (STATA) version 13 was used to analyze descriptive data. Thematic content analysis was used to analyze themes from FGDs, T-test, Chi square, ANOVA analysis and a regression were run to test the relationship between the outcomes and the intervention. From the baseline it was found that that SSFs experience complex problems that required all stakeholders in SPM and that the solution was the SLP. The SSFs who participated in the SLP gained from group formation and 10 SSFs each 1acre for seed potato multiplication. This acreage enabled them to participate in SPM as they donated more than 10 acres. There was increased knowledge and skills gained in SPM from the SLP which led to increased seed potato, increased participation, Establishing networks in the SLP. ADC Molo agreed to provide farm inputs and market for seed potatoes for the SSFs. This could enhance increased availability and accessibility of seed potato and increased incomes. This could also enhance dissemination of knowledge and skills on seed potato multiplication among SSFs and use of shared learning platform by small scale seed potato farmers.

**Key Words;** Shared learning platform, Innovation, Knowledge, small scale farmers

## 1.0 Introduction

Food security remains a challenge in Sub Saharan Africa (SSA). This has been attributed to several factors among them high population growth rate and low productivity of agricultural resources (Ogundari & Bolarinwa, 2018.). Majority of the SSA population depend directly or indirectly on the agricultural sector for their livelihoods (Muyanga & Jayne, 2019; Waaswa & Satognon, 2020). Potato is grown in many Sub-Saharan countries mainly by small scale farmers as a staple food and for commercial purposes (Chindi *et al*, 2017). However, potato production in these countries remains low. One of the major factors contributing to low potato production is use of low- quality seed potato, especially by small scale farmers (Food and Agriculture Organization [FAO],2018). Many SSFs lack access to quality seed potato due to limited availability coupled with high cost. In addition, many have limited knowledge and skills on seed potato multiplication (Tadesse *et al*, 2020). Agricultural research is a major source of knowledge and skills on agricultural technologies. In recent years, agricultural research has shifted from conventional practice towards more collaboration between researchers and other stakeholders, by using models such as the Innovation platform (IP) (Chilundo *et al.*, 2020). A Shared Learning Platform (SLP) is an innovation platform that allows for a process of working as a team to achieve a common objective. (Memari, 2019). The SLP is defined as a place for learning and for change, the stake holders share knowledge and learn together for positive change (Chilundo *et al.*, 2020). The SLP has been used to bring together team members to share knowledge and complement each other's skills, as they tend to obtain better results and achieve goals faster (Memari,2019). The SLP comprises of a group of individuals who often represent organizations with different backgrounds and interests. They could be farmers, traders, food processors, researchers, government officials (Chilundo et al., 2020). The members come together to diagnose problems, identify opportunities and find ways to achieve their goals (Soeparno, Perbangsa & Pardamean, 2018). They may design and implement activities as a platform, or coordinate activities by individual members (Chilundo et al. 2020).

In the shared learning platform people work as co-researchers with experts to generate evidence of practical relevance on implementation processes with and for people (D'Ambruoso, 2019). The SLP is an innovation that is social in nature with supporting connections between learners and the customization of content based on their needs (Soeparno *et al.*,2018) There is total interaction of actors and the science suppliers as knowledge is shared among participants (Osumba & Reche 2020). Learning occurs through a mix of formal, informal and experiential learning. The focus is structured on and around the process of discovering optimal solution as they share thoughts for innovations (Boileau, 2017). The learners give feedback and post queries which results in healthy discussions (Memari, 2019). A SLP is time saving, offers opportunities for collaborations, increases teaching productivity and engages learners through increased involvement (D'Ambruoso, 2019). The SLP has been used by farmers to improve agricultural productivity, a good example being farmer field school (FFS) which have been used globally (Wang, Wang, Liu & Wu 2020). The FFS is a group-based learning process that brings together concepts and methods. (Osumba & Reche 2020). Innovation Platforms (IPs) have been used in the value chain as vehicles in agricultural research and development for shared learning among actors (Soeparno,*et al*, 2018). A value chain (VC) can be defined as a business model that describes the full range of activities needed to create a product or service (Jahan, 2017). SLPs has been used as an innovation by researchers for the development of shared learning among the actors in the value chain. The VC comprises of many actors with each having a role to play in specific activity. Shared learning platform as an innovation would increase the probability of successful interventions in the small- scale farmers seed potato system (CIP, 2019). There are two

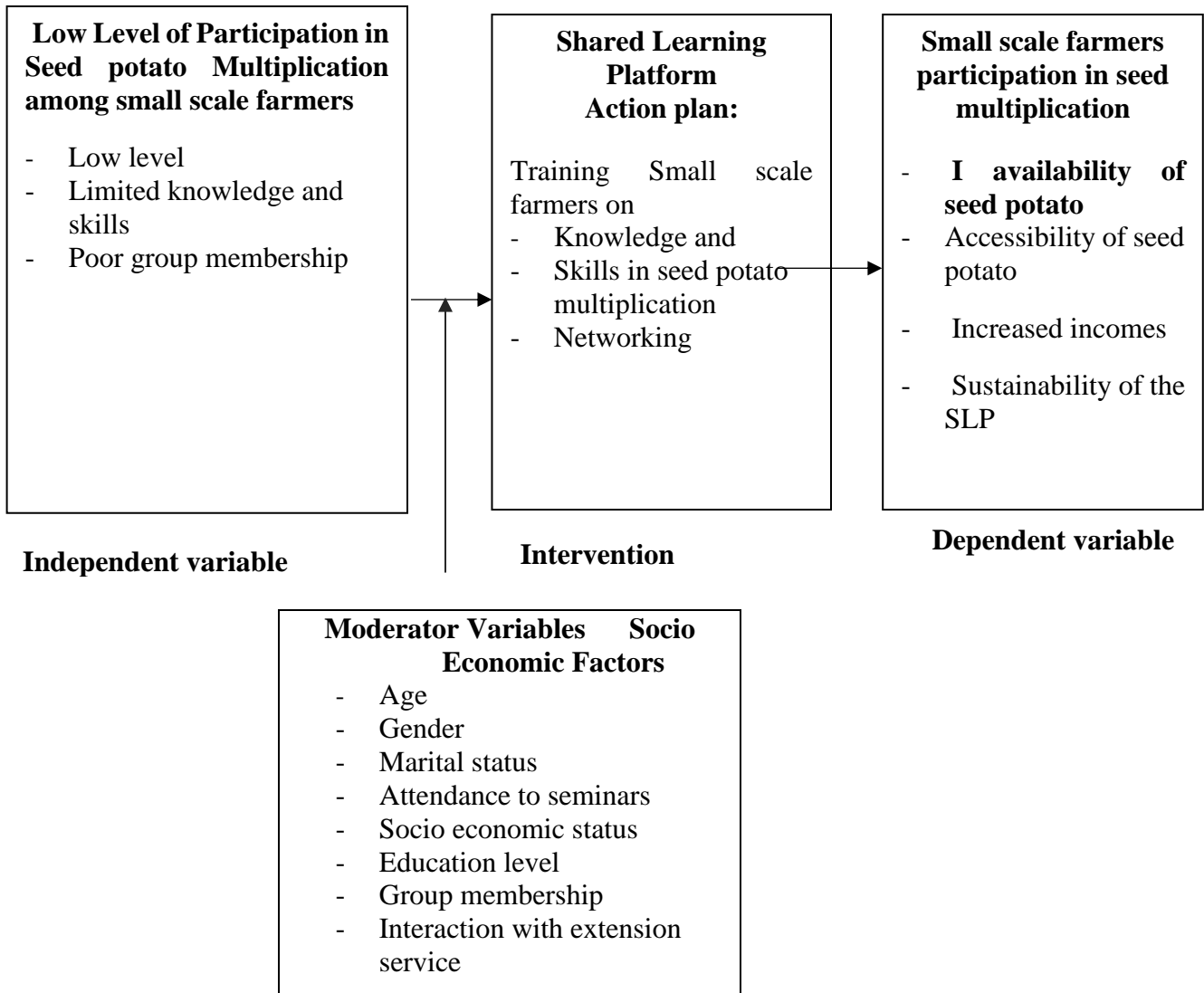
types of seed potato systems practiced by farmers; informal and formal. In the informal seed system, farmers use the remains from ware potato that is used for food and commercial purposes. The formal system is where seed is produced from mother plant through several stages to certified seed referred to as seed potato value chain. The seed potato value chain (SPVC) comprises of many actors each having a specific role in seed production stage (Tadesse et al., 2020). The SPVC begins with the mother from which the mini tubers are obtained to the Early Generation seed (EGS) is a stage of seed multiplication which is a planting material commonly referred to as seed ((Alliance for a Green Revolution in Africa [AGRA], 2018). This can be achieved by the trainings targeted to small scale seed potato farmers with minimum conditions to further multiply three generations (3G) or even certified potato seed.

Small Scale Farmers are the main potato producers in SSA however, they rarely participate in SPM in the seed potato value chain due to limited knowledge and acreage a requirement for participation by Kenya Plant Health Inspectorate Society (KEPHIS) a seed production regulatory body in Kenya, yet they are the main potato producers (Taiy Onyango & Nkrumwah, 2017). There, is limited availability and access to quality seed, SSFs have tended to rely on informal seed potato systems which lead to low yields (Namugga, *et al*, 2017). Seed potato multiplication is done mainly by large scale farmers and private companies who do not produce enough seed to satisfy the demand (Ministry of Agriculture, Livestock and fisheries [MOALF], 2018). Out of the total certified potato seed requirement (800MMT) only 2.6% (208MMT) is produced by five centralized organizations (National Potato Council of Kenya, [NCPK] 2017). Due to high demand and lack of quality seed potato, growers multiply 6 or 7 times or even more which leads to extreme degeneration of seed (Okello *et al*, 2016). The need for quality seed is so high to the extent that small scale farmers who are the main potato producers seek for alternative ways of getting seed potato in Nakuru County (MOALF, 2018). Limited availability of quality seed potato is one of the many factors that lead to poor yields.

The farmer saved seeds are normally of low quality, premature and most of the time disease infested leading to low production (Campos & Ortiz, 2020). The cost of certified seed in Nakuru County is high due to high demand and low supply with prices ranging between Ksh 2,500/= to ksh3200/= per 50kg bag (MOALF, 2018). This could provide opportunities for small scale farmers' participation in the seed potato value chain, to multiply the seeds for food security and to generate incomes. Only 18.6% of all small- scale farmers participated in the seed potato value chain (SPVC) however they could play the role of decentralized multipliers (Oywaya-Nkurumwa *et.al*; 2018). This could be adequately achieved by provision of knowledge and skills on SPM to ease access of production inputs and networking (Tadesse et al., 2020). This was the gap that this study seeks to narrow down and intended to establish and utilize a shared learning platform for building small scale farmers' capacity to participate in seed potato multiplication. The platform aimed at increasing knowledge and skills that will hopefully increase participation of small- scale farmers in seed potato multiplication for increased availability and accessibility of quality seed

The SLP as an intervention for small scale farmers' participation in the seed potato value chain for seed multiplication. fits well in the actor- oriented change Chindi *et al*, 2016). The study used a shared learning platform to bring about change in the knowledge and skills required for participation in potato seed multiplication. The SSFs were involved in the change since they participated in the whole process from problem identification to solution implementation.

**Figure 1: Relationship between variables**



## 2.0 Methodology

Survey Research and Participatory Action Research designs. Simple Random Sampling was used to select 120 small-scale potato farmers to participate in a survey. The stakeholders were purposively selected from their organizations. Twenty-five farmers were purposively selected from those who participated in the baseline survey to participate in SLP and implement SPM practices. Data collection was done using a structured questionnaire, key informant interviews (KII) and Focus Group Discussion (FGD) guides. The information collected was organized, checked and validated with information from the baseline survey, key informant interviews, focus group discussions, personal observation of the researcher and action learning as per the objectives, research questions and the theoretical framework. Qualitative data was continuously collected throughout the SLP intervention period and analyzed through Thematic Content Analysis Quantitative data analysis was done using

STATA 2013 specifically for descriptive studies, the statistical tests performed included; Z-test, T- test, Chi square at significance level = 0.05 and linear regression was also run.

### 3.0 Results and Discussion

The study investigated the influence of the Shared Learning Platform on seed Potato multiplication participation by small- scale farmers by testing the hypothesis that: Ho: There is no statistically significant influence of the SLP on participation in seed potato multiplication by small- scale farmers. To predict the influence of the SLP network on seed potato multiplication, a stepwise Multiple Linear Regression of the form  $y = a + b_1x_1 + b_2x_2 + b_3x_3$  was used to evaluate whether network quality (NQI), capacity building of farmers (CBI) and knowledge sharing (KSI) mean scores could predict seed potato multiplication index (SPMI). The results of the model are summarized in Table I, Table II and Table III.

**Table I: Model summary of multiple linear regression between SLP characteristics and Participation in seed Potato multiplication adoption strategies**

Change statistics									
Model	R	Adjusted R Square	Std Error of Square	R square Estimate	F change	Sig F change	Durbin df1	Durbin df2	Durbin change
1	.894a	.800	.796	.2183	.800	191.9	1	48	.000
2	.940b	.882	.887	.1694	.083	33.03	1	47	.000
3.	.960c	.920	.913	.14206	.036	20.55	1	46	.000

- a. Predictors: (Constant), Capacity Building Index
- b. Predictors: (Constant), Capacity Building Index, Knowledge Sharing Index
- c. Predictors: (Constant), Capacity Building Index, Knowledge Sharing Index, Network Quality Index
- d. Dependent Variable: Participation in seed potato multiplication Index

Table 2: Anova table for multiple linear regression

Model	Sum of square	df	Mean of square	F	Sig
1. Regression	9.142	1	9.142	191.897	.000 a
Residual	2.287	48	.048		
Total	11.429	49			
2. Regression	10.085	2	5.043	176.877	.000b
Residual	1.343	47	.0289		
Total	11.428	49			
3. Regression	10.500	3	3.500	173.441	.000c
Residual	.928	46	.020		
Total	11.428	49			

a. Predictors: (Constant), Capacity Building Index

b. Predictors: (Constant), Capacity Building Index, Knowledge Sharing Index

c. Predictors: (Constant), Capacity Building Index, Knowledge Sharing Index, Network Quality Index

d. Dependent Variable: Seed Potato Multiplication Participation Index

**Table 3: Regression coefficients**

Model	B	Std. Error	Unstandardized Coefficients	Beta	Standardized Coefficient	Sig
1. (Constant)		.908	.191		4.722	.000
Capacity building index		.765	.055	.894	13.852	.000
2. (Constant)		.507	.166	3.390	.003	
Capacity building index		.476	.064	.564	7.404	.000
Knowledge Sharing Index		.395	.069	.438	5.747	.000
3. (Constant)		.530	.138		3.830	.000
Capacity Building Index		.321	.064	.380	5.021	.000
Knowledge Sharing Index		.296	.062	.328	4.793	.000
Network Quality Index		.235	.052	.335	4.533	.000

a. Predictors: (Constant), Capacity Building Index

b. Predictors: (Constant), Capacity Building Index, Knowledge Sharing Index c. Predictors: (Constant), Capacity Building Index, Knowledge Dissemination Index, Network Quality Index

d. Dependent Variable: Seed Potato Multiplication Participation Index

From the Multiple Linear Regression results, the following model was constituted for the influence of the Shared Learning Platform on seed potato multiplication practices adoption strategies by small-scale farmers.  $CCAI = 0 + 0.894CBI + 0.438KSI + 0.335NQI$ . Capacity building is the most significant independent variable as it is an important means for farmers to gain knowledge on new technologies. Capacity is the ability to fulfill a task or meet an objective effectively for enhancing participation of small-scale farmers in seed multiplication (Chikaire *et al*, 2015). In a systems perspective capacity building is not a one-off intervention, but a continuous process of upgrading and change (Mbaabu & Hall, 2012). The study also revealed that learning-by-doing, reflection and

adoption as key elements of capacity building. It also entails establishing innovation platforms to connect ideas with opportunities (Nederlof et al., 2011). Capacity building in the SLP by Egerton University, ADC Molo and the Kuresoi North Sub County Department of Agriculture enabled farmers to access knowledge on seed potato multiplication practices and technologies, get linked to seed sources and institute processes towards collective marketing of their seed potato.

Knowledge sharing within and outside the SLP is the second most significant characteristic in Seed potato multiplication participation. It popularizes the innovation by providing necessary information, knowledge and skills in order to enable farmers to apply the innovation (Bauer & Karki, 2004). There should be an exchange of knowledge between all stakeholders, including farmers and researchers (Quarash, 1996). Knowledge Sharing within the SLP brings in the aspect of modern science mixed with indigenous knowledge in order to come up with appropriate seed potato multiplication practices for small -scale farmers participation. The study realized that Social Network Quality plays a significant role in seed potato practices adoption (Hall,2006). Farmers are more likely to adopt a technology when other farmers in their social network have adopted because they expect to share information, learn from each other and solve problems together (Bandieria & Rasul, 2003). Technology adoption has been one of the mechanisms through which social networks are posited to have an important effect on agricultural decisions (Munshi, 2004).

#### **4.0 Conclusions**

From this study, we conclude that the key determinants for SLP functioning for the SPM practices adoption for participation requires stakeholder participation, quality networks, knowledge sharing, reflection, capacity building resource mobilization, commitment and ownership. Interactions of small -scale in the shared learning platform. Networks would create opportunities for farmers empowerment for collaborations and interaction. Promotion of shared learning platform innovation would address the challenges farmers face in participating in seed potato multiplication. Capacity building in SLP is an important means for farmers to gain knowledge information on seed potato multiplication practices and technologies adoption. This occurs when farmers interact with other stakeholders to network and innovate for knowledge generation on seed potato Multiplication practices adoption as this enables seed potato value chain actors to share information, learn from each other and solve problems together. It is key in technology dissemination since farmers are likely to adopt a technology when other actors in their social network have adopted it. After the intervention 10 SSFs donated more than one acre for seed potato multiplication as per the KEPHIS for the next season as a group since they qualified as per KEPHIS regulation

#### **5.0 Recommendations**

Our study recommends that it is necessary to have a centralized coordination mechanism for small scale farmers participation in seed potato multiplication for the availability of certified seed and as a way of mitigation of shortages as well as the adoption of the necessary practices and implementation in seed potato value chain by small scale farmers. This will entail putting in place policies and institutions that will address and prepare the country to address the challenges experienced by small scale farmers in seed potato multiplication for availability of certified seed potato. There is a need for coordinated effort to enhance seed potato multiplication by small scale farmers. There is need for the researchers and the extension agent to be conversant with the identified farmer socio -economic characteristics which may influence their participation in seed potato multiplication and improve farmers' capacities for the involvement to reduce risk or make optimal use SPM practices for

availability and access of certified seed potato for increased production and incomes. This can be achieved through applying participatory research and extension activities for up scaling of SPM practices adoption strategies developed collaboratively by actors using a Shared Learning Platform. To bridge the existing deficit in certified potato seed, small-scale farmers should be trained on certified seed potato multiplication techniques such as site selection crop management and postharvest handling for certified seed positive and negative selection. This would ensure timely access to certified seed potato by farmers at a more affordable price. Small-scale farmers need to form groups, cooperatives and engage in contract farming in order to overcome technological and market constraints. Collective marketing of farm produce and acquisition of inputs enable the farmers to negotiate prices in order to benefit from the economies of scale. Cooperatives facilitate bulking of farm produce for access to niche markets.

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