Adoption study of postharvest and Agro-processing Technologies and Interventions in Nigeria:

Reasons for Adoption and Non-adoption

(2012 – 2016)

By

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EXECUTIVE SUMMARY

This is a report of the adoption of postharvest and Agro-processing Technologies and Interventions in Nigeria of the Sasakawa Global 2000 Program in Nigeria (SG 2000- Nigeria). The study was conducted in Adamawa, Gombe, Kano and Jigawa states from 2000 - 2016. The study examined the justification for adoption and non-adoption of postharvest and Agro-processing Technologies and Interventions in Nigeria among farmers in the four partnering states of SG 2000 intervention in northern Nigeria. The persons, places and institutions visited in the areas of the intervention are presented in the appendix, and relevant tables concerning the results of the work in the four main participating states - Adamawa, Gombe, Kano and Jigawa are also presented.

The methodology used include administration of questionnaire, a desk study of SG 2000 publications and references materials on postharvest, plus several interviews during a visits to farmers and the beneficiary groups, villages, processing centres, and offices of the ministries of agricultures and ADPs[1]. Data were collected from 127 farmers/women processors who constituted the respondents (Adamawa, 30 Gombe 35, Kano 37 and Jigawa 25) and analysed with frequency tables and logistic regression. Data analysis reveals that there were several traditional postharvest handling technologies used by farmers. The findings of the adoption study on postharvest in Nigeria include information gained during discussions with service providers, women processors, farmers, extension personnel, researchers, collaborating fabricators and agro-processing stakeholders. The views gathers covered their perspectives and their own experiences and impressions. Secondary information from the Agricultural Development Programs (ADPs) of the states and SG 2000-Nigeria helped to the adoption, achievements and constraints, and to identify areas for emphasis, consolidation and/or expansion. Their adoption of postharvest and storage technologies was low with lack of access to the technologies being the most widely adopted (28.3%). Logistic regression analysis indicates that age (odd ratio = 0.67), farm size (3.68), farming experience (1.25) and contact with extension agents (1.79) had significant (p is less than 0.05) influence on farmers' adoption of improved postharvest and storage technologies. Major constraints limiting the farmers' adoption of these technologies were ignorance of

[1] Agricultural Development Projects

technology existence (100%), non-availability (46.5%) and high cost (34.6%) of the some of the postharvest and storage technologies. From aforementioned it was clear that postharvest and Agro-processing Technologies and Interventions in Nigeria has contributed to significantly increase output and value addition in the project areas. Several adoptions and transfer of ownership to a larger extent has been accomplished. Farmers should be provided with wider and cost effective information regarding improved postharvest and storage methods as well as exposed to training on their use. Other key findings revealed by the study include;

- 76.1% of the respondents sold more than 50% of their produce immediately after harvest to the nearby local market.
- The study reveals that 57.9% of the respondents are not aware of improved post-harvest and agro processing technologies since the equipment are not available in the farmer's locality as informed by 78.9% of the respondents.
- 42% of the FBOs engage in agro-processing—the transformation of raw agricultural products into other forms. Common examples are maize threshing, rice parboiling, groundnut to groundnut oil, groundnut cake and paddy to rice.
- Majority of the Women processing groups (72%) did not own processing equipment except in situation where they are originally provided to by government agencies or NGOs.
- For processing their product most of the farmers do not own equipment, they rent from someone in their community. The inputs for collective processing may come from collective farms or from individual farms.
- Some processing groups own their processing equipment, but members themselves do not necessarily undertake collective processing.
- In 10.8% cases, individual members and the group had the access to technical-know how on improved post-harvest and agro processing technologies.
- In most cases, the groups render grinding services to the non-members within the community at a fee that is either equal to or higher than member fees.
- Approximately 11% of the groups reported that they had received training on processing techniques through various Agricultural stakeholders.
- Consultation on post-harvest and agro processing issues is slim among the FBOs which is done by the extension agents.

- The EAs are the major (78.8%) source of agricultural information on PHAP. The FBOs members have access to radio (81.1%)
- FBOs would be able to produce products of higher quality collectively than individually. The FBOs thus were able to pin point their need of postharvest tools and equipment such as maize thresher, maize miller, groundnut oil extractor, rice miller, rice thresher and training on farmer group enterprise management, etc

Background

Post-harvest handling and storage losses have been of concern even to the United Nations which brought it to international focus when it declared in 1975 that "further reduction of post-harvest food losses in developing countries should be undertaken as a matter of priority" (FAO and UNEP 1981). This led many national governments to take more seriously the problems of storage of agricultural produce. Although attempts have been made to increase agricultural production by bringing more land into cultivation and use of improved seeds and chemicals, these have been less effective because any apparent gain in production has been lost from the moment the food crop is harvested to the time it reaches the consumers' table (Oracca-Tetteh 1978). In Nigeria Agriculture is important sector of the national economy, employing about 70 percent of the population (predominantly rural) and accounting for about 90 percent of rural activities. A majority of farmers are subsistence producers; further, fragmentation of agricultural lands is common due to traditional inheritance patterns in an exploding population. Most farms are less than one hectare in size. Some 60 percent of the population lives below the poverty line. Agricultural productivity is low, and poverty is greater in rural areas than in urban areas. Poor agricultural sector performance has been attributed to: I) small land holdings, 2) slow dissemination of improved technologies to farmers, 3) poor access to modern inputs such as seeds, fertilizer, pesticides. Labour - saving tools and credit, 4) low literacy levels, 5) lack of rural infrastructure, and 6) lack of markets.

The Role of State and Local Governments in Agriculture

Nigeria formally came into existence in 1914, achieved its independence in 1960, and became a federation in 1963. The country has experienced military dictatorships as well as limited periods or democratic governance; hence, during twenty-eight or its forty-two years or independence, Nigeria was under military rule and eight military heads of state. At present, an elected democratic government has been in power

since May, 1999. Most Nigerian military governments have not demonstrated much interest in agriculture. Nigeria has three tiers of government: Federal, State (36 states plus the Federal Capital Territory-FCT) and 774 Local Government Authorities (LGAs). Traditional monarchies exist side by side with modern democratic governmental entities; however, the traditional entities exercise mostly ceremonial power rather than legislative power. At the state level, the Governor is the chief executive, and the house of assembly performs the legislative functions. At LGA levels, the chairman is the chief executive and his councillors are delegated to perform the legislative function.

President O. Obasanjo, Nigeria's current elected leader, for many years has demonstrated a strong commitment to agriculture and agricultural development. He also has had a long interest in SG 2000 and its activities, and is credited with inviting SG 2000 to Nigeria. In recent years, slate and local governments have assumed a larger role in agricultural development, partly as a result or efforts to decentralize governmental activities. III some cases, state governments have taken a more active role will encouraging and promoting agricultural improvement and economic development, as have some Local Government Authorities.

Postharvest and postharvest losses

Most countries in Africa and most notably the low-income, food-deficit countries (LIFDCs) have become especially concerned about the global food situation and outlook in recent years. While the proximate cause of this heightened concern was the surge in food prices that began in 2006 and peaked in mid-2008, concerns remain for other reasons, among them the higher market prices that now seem to prevail, continuing price volatility, and the risk of intermittent food shortages. For lower- income sub-Saharan Africa countries, contributing factors to the feeling of increased food insecurity include persistently low agricultural productivity, difficulty in adapting to climate change, inability to handle the financial burden of high food and fuel prices in the context of limited access to credit, and an increased dependence on food aid. Yet there is an additional, oft forgotten factor that exacerbates food insecurity. Post-harvest losses (PHL), which can and do occur all along the chain from farm to fork resulting in higher prices and lost revenue which reduces real income for producers and consumers and especially the poor, since such a high

percentage of their disposable income is devoted to staple foods. It is now increasingly realized that reducing PHL along food chains can, in certain cases, provide a more cost-effective and environmentally sustainable means of promoting food and nutrition security than investments focusing on increasing production. It can serve to reduce the wastage of scarce production resources (land, water, inputs) thus ensuring more sustainable food supplies. However, despite considerable knowledge about the topic, accurate figures are lacking on actual levels of PHL (both qualitative and quantitative) occurring in sub-Saharan Africa. In addition, as far as technologies for PHL are concerned, it is not clear what factors determine their adoption at local levels and up and down the value chain.

The profile of PHL has been significantly raised in the aftermath of the recent food and financial crises and interventions in PHL reduction are seen as an important element of the efforts of many agencies to reduce food insecurity in Sub Saharan Africa. This is particularly so for grains which constitute the basis for food security for the majority of the population in the region and a vital component in the livelihoods of smallholder farmers. For cereal grains alone, one estimate1 puts the value of quantitative PHL in the continent at more than US$4 billion annually. Of even greater significance are qualitative PHL which take the form of reduced revenues due to quality and market opportunity losses. PHLs also have an impact on the nutritional value of grains and have resulted in adverse effects on the health of populations consuming unsafe food, notably those contaminated with aflatoxins. In the light of the soaring prices in 2007/08 and the risk of food shortages in the future, investments in reducing post-harvest losses are seen as a potentially cost-effective and environmentally sustainable option to enhance food security of especially vulnerable populations.

When world food is viewed in terms of a system of production, distribution, and utilization, it becomes obvious that in our attempts to improve the system we have allocated most of our resources the production component. Distribution and utilization have been comparatively neglected. But hunger and malnutrition can exist in spite of adequate food production. They can be the result of unequal distribution of food among nations, within nations, within communities, and even within families. Loss and deterioration of available food resources further add to the problem. Hence, maximum utilization of available food is absolutely essential. Of the agricultural

commodities consumed as food, grains (cereals, legumes, oilseeds) contribute the bulk of the world's calories and protein.

Objectives of the study

It is evident that significant investment has been made towards promotion and establishment Agro-processing centres for value addition, postharvest and storage technologies in Nigeria and several other related packages on postharvest. Whether these PHAP technologies introduced are on the track of sustainability and scalability to made significant changes to farmers/women groups/FBOs livelihoods remains a question to which its answer need to be investigated. There has to be reasons/justifications for adoption/non-adoption and feasible recommendations needed. It has been observed that, in the recent assessment by the SG 2000 MELS Theme in Nigeria through a rapid assessment it was discovered that not all of the women/women groups are actually employing a more decent cost-benefit and deploy the required economic and technical skill that will ensure sustainability and scalability of these PHELP (SAA, 2011). It is important to conduct a comprehensive Adoption study of postharvest and Agro-processing Technologies and Interventions in Nigeria with a view to sufficiently establish Reasons for Adoption and Non-adoption. Specifically, this study looked at the following objectives, which are to:

1. Identify the personal characteristics of farmers/farmer groups who witnessed postharvest intervention of SG 2000 – Nigeria.
2. Assess the traditional postharvest and storage methods the farmers are presently using
3. Assess the farmers' awareness and adoption of improved postharvest and storage methods recommended by the state extension service.
4. Determine the factors affecting the adoption of these improved storage methods by the farmers.
5. Ascertain the seriousness of post-harvest losses and identify the storage problems faced by farmers in the study area

SG 2000-Nigcria Operations: Postharvest and Agro-processing component

SG 2000-Nigeria works with and through the extension services of the ADPs in each participating state. Under the management and supervision of the SG 2000-Nigeria

state coordinators, extension Agents (EAs) work directly with farmers to ensure successful implementation of various technologies components across its strategic goals of Crop productivity enhancement, postharvest and agro-processing, public private partnership and SAFE. Technology transfer and assisting farmers in obtaining inputs and solving day-to-day problems is the major focus for SG 2000 intervention.

Through its postharvest and Agro-processing theme, the projects aims to improve the postharvest handling, storage and processing of agricultural produce to reduce losses in order to increase income and improve the livelihoods of smallholder farmers and agro-processors. The specific objectives of the thematic area include;

- To promote the use of appropriate postharvest handling, storage and agro-processing technologies that reduce losses, improve quality and food safety, and enhance smallholder farmers' food security and income.
- To strengthen extension capacity to provide training and advisory services in storage and value-adding technologies.
- To promote development of off-farm agro-processing enterprises especially with women and youth
- To promote and strengthen private service providers to supply and maintain recommended labour-saving and efficiency-enhancing technologies and services to farmers and processors

Strategies for Postharvest and Agro-processing programs of SG 2000 – Nigeria in its participating states

Several postharvest and Agro-processing technologies were provided by the theme in the various participating states of Adamawa, Gombe, Kano and Jigawa states. The first point of intervention by the theme has been analyzing the status of postharvest handling, storage and processing of selected major agricultural commodities in intervention areas. The nature of the postharvest gap identified always determine and prioritize the required intervention. The theme identify promising PHAP technologies required for major agricultural commodities in the areas of intervention.

Demonstration of Postharvest and Agro-processing handling technologies in Nigeria

As previously described, the SG 2000 approach to technology transfer is to allow postharvest and agro-processing technologies that reduce losses, improve quality and food safety, and enhance smallholder farmers' food security and income as follows:

- Identifying technologies through analyzing the status of postharvest handling and agro-processing requirements of selected major agricultural commodities in intervention areas
- Deciding on providing or Establish/strengthen postharvest and agro-processing extension and learning platforms (PHELPs);
- Training the farmers/farmers group and frontline extension personnel to leant the technology and ensures that it works well
- Helping the benefiting group to obtain the required facilities for maintenance and train the technicians necessary to support the agro-processing centres;
- Supervising the established Agro-processing centres to ensure compliance with the technology provided.

Since 2010, significant progress has been made in reaching smallholder women/women farmer groups through provision of Maize Schaller, Groundnut and Rice processing Mills in the partnering states in Nigeria using core and extra-core funds.

Table 1: Number of Sampled Agro-processing centres established in Nigeria (2012-2016)

State	Local Government	Name of Women Group	Type of Enterprise	Product processed
Adamawa	Fufore	Unity Farmers Association	G/nut oil Processing	Groundnut oil, G/nut cake
	Ganye	Tikamen Women farmers Association	Cassava Processing	Garri and Starch
	Larmorde	Alheri Women MPC	Rice Processing	Parboiled Rice
	Madagali		Maize Processing	Maize flour
Gombe	Gombe	Dadin-Kowa Women MPC	Rice Processing	Parboiled Rice
Kano	Garko	Rariyar kampa	Rice Processing	Parboiled Rice
	Bunkure	Bunkure Rice	Rice Processing	Parboiled Rice

		processing group		
Jigawa	Birnin Kudu	Sara Women Group	Groundnut Oil Extraction	Groundnut oil, G/nut cake
	Birnin Kudu	Kafin-gana Women Rice Processing Mill	Rice Processing	Parboiled Rice
	Malam Madori	Women Rice Processing Mill	Rice Processing	Parboiled Rice
	Hadejia	Yar-Kunama	Rice Processing	Parboiled Rice
	Kazaure	Women Rice Processing Mill	Rice Processing	Parboiled Rice
	Kiri-Kasamma	Women Rice Processing Mill	Rice Processing	Parboiled Rice

Source: Field survey, 2016

RESULTS AND DISCUSSION

Personal Characteristics of Respondents Results of Table 2 show that production activities in the study area is male dominated (94.5%), which may be attributed to the intensive labour requirement. Most respondents were married (83.5%) while more than half (60.6%) had a low educational experience not exceeding primary education, which may impede their acceptance of improved postharvest and storage technologies since education facilitates farmers' adoption of innovations (Onemolease, 2005). Most respondents were above 40 years (81.16%) indicating an ageing farming population, which is consistent with the assertions of Ekong (2003) that farming and processing activities in the rural areas of Nigeria is dominated by older farmers because of the outmigration of youths to urban centres in search of white-collar jobs. The farmers are quite experienced in farming activities since the majority of them (45.6%) have been cultivation the crop for over 20 years. About 52% of them have 5-9 members in their household, implying that they have access to costless labour thereby reducing labour cost. The small operational scale of the farmers (67.7% had 1ha and below) may limit output and constrain adoption of modern postharvest and storage facilities (Bhattacharyya 1997). The economic return to their production in the study area is very low: only 43.3% realized an annual income of 20,001-40,000 naira (147.05 – 294.11 US dollars). The finding of the study also suggests that; farmers produced other crops, as confirmed by the researchers' observation of the farming system in the study area, which is characterized by mixed cropping.

Table 2: Personal Characteristics of the Respondents (n = 127)

Variable	Frequency	Percentage
Gender		
• Female	7	5.5
• Male	120	94.5
Marital Status		
• Single	106	83.5
• Married	21	16.5
Educational Level		
• Did not go to School	24	18.9
• Primary School	53	41.7
• Secondary school	41	32.3
• Post-secondary school	09	7.1
Age (Years)		
• Below 30 years	3	2.4
• 31 – 40	47	36.5
• 41 – 50	63	49.6
• 51 and above	40	31.5
Farming Experience		
• Below 10 years	30	23.7
• 11 – 20	39	30.7
• 21 and above	58	45.6
Household size		
• Below 4 persons	17	13.4
• 5- 9	66	52.0
• 10 – 14	32	25.2
• Above 14	12	9.4
Farm size/ha		
• Below 1	86	67.7
• 1.1 – 2.0	24	18.9
• Above 2.1	17	13.4
Income (N)		
• Below 20,000	24	18.9
• 20,001 – 40,000	55	43.3
• 40,001 – 60,000	26	20.5
• Above 60,000	22	17.3

Source: Field survey, 2016

Table 3: Reasons for the Farmer Based Group formation

Farmer's Opinions	**Percent**
To address common farming problems	6
To collectively share and acquire new farming methods	10
To collectively boost Crop productivity	17
To poster unity among members	68

Source: Field survey, 2016

Table 3 shows that the major reason that made respondents to form group is to poster unity among members which comprises of (68%) of the farmers group, followed by (17%) of the farmers group that are in the view that the reason that make them to form a group, is to collectively boost their crop productivity (quantity per unit area). (10%) of the respondents form group to collectively share and acquire new farming methods, while the least of the respondents (6%) form group to address their common farming problems. Group formation is one of the way that help farmers to increase production and productivity were they can obtain loan, inputs and other assistant from the government and other nongovernmental organisation.

Table 4: Funding of Farmer group activities

Ways and means	**Percent**
Mandatory contribution during meetings	4.2
Voluntary Individual support	35.1
Calling for members support	6.2
Monthly/Annual/Weekly Contribution	4.6
Mandatory contribution on farming season	5.4
Other levies and dues payment	22.4
Donations from patrons	15.0
Others	6.9

Source: Field survey, 2016

From table 4 it can be clearly seen that (35.1%) of the respondents lamented that voluntary individual support is one of the means they used to fund their activities, (22.4%) of the farmers group used levies and dues in funding their activities, (15%) funded their activities from the donation obtained from the patrons. (6.9%) of the farmers group used other means in funding their activities,(6.2%) of the farmers group called for members support in order to fund their activities. Mandatory contribution during farming season by members of some farmers group which comprises of (5.4%) of the respondents used it to fund their activities, while (4.6%) of the respondents used weekly/monthly and annual contribution in funding their activities, and the least among the respondents group (4.2%) used mandatory

contribution during meeting in funding their activities. It is indeed no organisation can run their activities without a fund; therefore it is necessary for the members of that organisation to find the way of sourcing the fund.

Table 5: Estimated value of the enterprise operate by farmers (N.00)

Amount	Percent
10,000 – 59,999	34.0
60,000 – 99,999	1.9
100,000 – 149,999	1.9
150,000 – 199,999	7.3
200,000 – 209,999	6.9
210,000 – 229,999	10.8
230,000 – 299,999	6.9
300,000 – 399,999	10.8
400,000 – 500,000	19.3

Source: Field survey, 2016

Table 5 shows that (34%) of the farmers run their enterprises within the range of N10, 000- 59,999, followed by 19.3% that operate within the range of N400, 000 – 500,000. Those that operate within the range of N300000 – 399999 were (10.8%) of the farmers so also another (10.8%) operate within the 210000- 229999. (7.3%) operate within the 150000 -199999.Those that operates within the value range of N230000- 299999 were (6.9%) of the farmers. Another (6.9%) operate within the range of N200000 – 209999. Those that operate within the range of N100, 000-149999 and N60000 – 99999 constituted about 1.9% of the respondents each.

Table 6: Awareness of improved postharvest and agro processing technologies

Option/responses	Percent
Yes	42.1
No	57.9

Source: Field survey, 2016

Table 6 revealed that one of the area that emphasis is now putting is the area of agro processing and post-harvest technology were by majority (57.9%) of the respondents were not aware of the improved postharvest and agro processing technology while (42.1%) are aware of that. Awareness creation is one of the important aspects that farmers are lacking more especially with regard to agro processing and postharvest activities.

Table 7: Types of Technologies known to farmers

Technologies	**Percent**
Maize thresher	10.0
Maize threshing technology	9.3
Parboiling	8.9
Rice milling	1.9
Threshing	1.9
Others	68.0

Source: Field survey, 2016

Table 7 indicated the types of technology known to the farmers were by majority known other type of technology despite the ones mentioned above in the table. Those that know maize thresher were (10%) of the farmers followed by (9.3%) of the farmers that known maize threshing technology. (8.9%) of the farmers known parboiling technology while those that known rice milling and threshing constitute (1.9%) each of the farmers.

Table 8: Availability of the Technology within the farmer's communities

Options/responses	**Percent**
Yes	21.2
No	78.8

Source: Field survey, 2016

Table 8 tries to explain whether the postharvest and agro processing technology are available within the farmers' community or not. From the table it can clearly seen that majority of the farmers (78.8%) reported that the postharvest and agro processing

technology were not available within the farmers communities while (21.2%) reported that there is availability of such technology within their communities.

Table 9: Sources of farmer's information on Postharvest Technologies

Source	Percent
Extension agents	21.2
ADP office	6.9
Neighbouring farmer(s)/farmer groups	1.9
Nearby city	9.3
Others	60.6

Source: Field survey, 2016

Table 9 revealed the source of information among the farmers were majority source their information from other sources followed by (21.2%) of the farmers that source information from extension agents. Nearby city serve as a source of information to (9.3%) of the farmers and (6.9%) source their information from Kano Agricultural and Rural Development Authority (ADP) office. Those that source information from neighbouring farmers/ farmers groups constitute (1.9%) of the farmers and they were the least.

Table 10: Availability of Knowledge to operate, maintain and repair improved postharvest and agro processing technologies

Option/responses	Percent
Yes	10.8
No	89.2

Source: Field survey, 2016

Table 10 shows that majority of the farmers (89.2%) don't have available knowledge to operate, maintain and repair improved postharvest and agro processing technology while (10.8%) have that knowledge. This is in line with table 27 were majority of the farmers reported that there is no availability of the technology within the farmers communities.

Table 11: Means of acquiring Repairs and Maintenance skill among farmers

Sources	Percent
From other technicians	10.8
Others	89.2
Total	100.0

Source: Field survey, 2016

Table 11 explained the means through which those that have knowledge on how to operate, maintain and repair of agro processing and postharvest technology skill. From the table, (89.2%) of the farmers acquired the skill from other source while (10.8%) acquired the skill from other technicians.

Table 12: Availability of postharvest and agro-processing program(s) in the farmer's villages

Option/responses	Percent
Yes	10.8
No	89.2

Source: Field survey, 2016

Table 12 indicated the availability of post-harvest and agro processing program in the farmers village were majority of the respondents (89.2%) reported that there were no availability of such programme in their areas, while (10.8%) reported that there are such programme in their communities. This is in line with table 27 were majority of the respondents reported that there were no such programme in their community.

Table 13: Respondent's Perception on Postharvest and Storage Losses

Perception	Percentage
Not Serious	34.6
Serious	44.1
Very Serious	21.3

Source: Field survey, 2016

The result of Table 13 shows that 44.1% of the respondents experienced serious post-harvest storage losses, 21.3% suffered very serious losses while 34.6% considered the losses not serious. The finding shows that majority of the producers encountered severe post-harvest storage losses, and this calls for serious concern.

Table 14: Respondent Classification Based on Use of Improved Postharvest and Storage Methods

Categories	Percentage
Adopters	66.9
Non- Adaptors	33.1

Source: Field survey, 2016

Table 14 reveals that the majority of the respondents (66.9%) did adopt any of the improved Postharvest and storage methods while 33.1% have not adopted at least one of the several methods. The result indicates that the level of adoption was very higher in the study area, and probably explains the reason for improved post-harvest handling and reduction in storage losses experienced by the farmers (see Table 13)

Assessment: Justification for adoption and Non-adoption

The result of Table 15 reveals that Higher cost of the technologies (100%), non – availability (46.5%) and ignorance of existence of Postharvest and storage methods (34.6%) of postharvest and storage technologies accounted for farmers non-use of modern postharvest and storage technologies, while about 20% claimed not to understand their use. The percentage of non – response was high because respondents felt they could not explain their non – adoption for technologies whose existence they are not aware.

Table 15: Reasons for Non-Adoption

Categories	Percentage
Higher cost of the technologies	100
Non- Availability	46.5
Ignorance of the Technology Existence	34.6

Do not understand how to use the technology	19.7

Source: Field survey, 2016

Utilization of Similar Technology before SG 2000 PHELP Intervention

When the respondents were asked whether they have come across and used any form of Postharvest and storage technologies similar to what they learnt from SG 2000 their answers were affirmative, NO. All of them (100%) responded that; prior to the introduction of SG 2000 postharvest technologies, they were mainly using local technology to process their crops and that the local technology was self-sponsored and inefficient relative to the existing one provided by SG 2000.

Reasons for Using the SG 2000 cassava PHELP Technologies

On the reasons which prompted the farmers (Men and Women) to use the existing postharvest and agro-processing technologies, 65% of the women were of the opinion that they used the technology so as to improve the quantity of their products 20% of the women used the technologies in order to increase their output and income, while 15% argued that they used the technologies in order to reduce fatigue/labour and increase and increase productivity in terms of producing higher output.

From the responses; it can be deduced that the main reasons for the utilization of postharvest and agro-processing technologies by the farmers were basically to improve the income accruing to them and to increase the efficiency of the product and reduce fatigue. These reasons are consistent with characteristics of a good innovation (see Adebayo and Adedoyin, 2005)

Relationship between Farmers' Characteristics and Adoption of Improved Postharvest and Storage Methods by Farmers (Logistic Regression)

Table 16 shows that a significant ($p \leq 0.05$) association exist between farmers age (Odd ratio = 0.67), farming experience (1.25), farm size (3.68), contact with extension agents (1.79) and adoption of improved postharvest and storage technology. The R square (0.683) shows that about 68% of the odd/ likelihood of farmers adopting improved postharvest and storage technologies is explained by the independent variables with a percent prediction of 92%. The significance of the

model is given by the model chi-square (85.56; p≤ 0.05). Older farmers were 0.67 times less likely to adopt improved postharvest and storage methods compared with younger farmers, corroborating the finding of Lemchi et al. (2003) that younger farmers are more likely to adopt farm innovations than the older farmers being more willing to take risk. Farmers with longer farming experience are 1.3 times more likely to adopt improved postharvest and storage technology compared with the less experienced farmers. Onemolease (2005) obtained a significant negative relationship between farming experience and adoption of technologies. Farmers with large farms are almost 4 times as likely as their farmers with smaller farms to adopt improved postharvest and storage technology. Farmers with larger farms have been reported to be positively disposed to use of farm innovations (Agbamu 1993), largely because having larger farms strengthens farmers capacity to produce more, which he/she would be interested in preserving from loss. Farmers' in contact with extension agents are almost 2 times (odd ratio = 1.78) as likely as those with no contact to adopt improved postharvest and storage technology. The result agrees with the findings of Atala et al. (1992). Extension agents, by interacting with farmers, are able to convince them to implement recommended farm innovations.

Table 16: Relationship between farmer's characteristics and adoption of improved Postharvest and storage method (Logistics regression)

Variables	***Odd ratios***	***Probability Level***
Sex	0.001	0.683
Education	1.18	0.683
Farming experience	0.67*	0.000
Household size	1.25*	0.000
Income	1.133	0.243
Contact with extension agents	3.68*	0.005
Model Estimates	0.82	0.503
% correct prediction	1.79*	0.044
Nagelkerke R Square		
Model Chi-square	92.1	
	0.682	
	85.56	

Source: Field survey, 2016

Conclusion and Recommendations

The results of the study indicated that farmers in the study area experienced serious postharvest and storage losses. Despite the dissemination of improved postharvest

and storage methods most farmers claimed not to be aware and are yet to adopt the technologies. Reasons for the low adoption was, apart from lack of awareness of the postharvest and storage methods, include non – availability and high cost of the postharvest and storage technologies in addition to a poor understanding of technology utilization (19.7%). To facilitate the adoption of modern postharvest and storage technologies among farmers in the study area, the following recommendations are proposed;

- Extension agents should actively disseminate information on improved postharvest and storage techniques to farmers in the study area through use of mass media (e.g. radio/tv) and farmers groups.
- To solve the problem of inadequate capital, farmers should pool their funds through joint contribution. Such funds can be used to purchase the costly postharvest and storage facilities.
- Available sources of postharvest and storage technologies should be communicated to farmers by the zonal extension service.
- Use of some modern postharvest and storage technologies require specialised skills and technical know-how which farmer's lack.
- Farmers and extension staff should continuously be trained on the use of these improved postharvest and storage methods.

In general, potentially effective improved post-harvest technologies for grains have been identified. In future, the focus of post-production activities for grains should be on adapting the new technologies to specific environments and ensuring that they are economically and socially viable. For other crops, however, there is much potential for further technology development at the level of small- and medium-scale enterprises. For example, there is scope for derivation of new products with market prospects from traditional crops such as sweet potato. Post-harvest technology is commodity and location specific. The present requirement is to adapt/develop/refine the need based and market driven PHT and Equipment for loss prevention, processing and value addition to raw food/feed materials of plant and animal origin for household consumption and national and international markets.

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