

FACTORS INFLUENCING SUSTAINABILITY OF CEREAL BANKS AMONG MAIZE FARMER GROUPS IN KIMILILI SUB-COUNTY, KENYA

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Abstract

In Kenya, maize cereal banking is an approach to marketing that aims at enhancing local food security and surplus produce for sell to larger-scale buyers. Despite efforts by Government of Kenya, NGOs and other civil society in establishing maize cereal banks, there has been perceived problems associated with their sustainability. The study investigated the influence of access to extension services and level of participation in group activities on sustainability of cereal banks among maize farmer groups in Kimilili Sub-County, Kenya. The study adopted descriptive survey design. Questionnaires were administered to 188 maize farmers while 4 Ward Agricultural Extension Officers were interviewed. Data was analyzed using SPSS. Findings revealed that lack of access to reliable markets and inability to adopt agricultural technologies influenced sustainability of cereal banks. In addition, the farmers were not satisfied with their level of involvement in group activities. To ensure sustainability of cereal banks, the study recommends the need for training of leaders on management skills by extension officers to enhance group cohesion. The extension service providers should focus on capacity building farmers to enable them produce surplus maize and store appropriately; and to access reliable market information.

Keywords: Maize, Cereal Banks, Extension Services, Sustainability Participation, Agricultural Technologies, Food Security

INTRODUCTION

Poor marketing strategies and lack of markets are arguably the greatest challenges facing the agricultural sector in Kenya and the rest of Africa (Argwings-Kodhek, 1998). A cereal bank (CB) is an example of producer groups usually based at the village level, which seeks to improve market outlets for surplus grain and at the same time improve the quality of food available for those who need to buy from the market, particularly during the lean months when there is little production (SACRED-Africa, 2004). Agricultural extension services provide farmers with important information, such as patterns in crop prices, new seed varieties, crop management and marketing. Exposure to such activities is intended to increase farmers' ability to optimize the use of their resources. Nompozolo (2000) suggested that for good performance, a reasonable amount of information is necessary to back up agricultural productivity. Doll and Francis (1992) suggested that the extension professionals' knowledge about the concept of sustainability is necessary in order to move any programme forward and must remain current on agricultural information and technologies.

One way of transforming agriculture is by exposing small-scale farmers to improved agricultural production technologies, such as high yielding seed varieties and appropriate technologies. According to Sunding and Zilberman (2000), technological change has been a major factor shaping agriculture in the recent past. The main explanation for such increase is change in agricultural production methods, chief among which is the use of improved or high yielding seed varieties. Participation in group activities would be an important indicator in developing farmers' understanding and appreciation of an organisation (Gray, Kraenzle & USDA, 1998). Members of organizations are also patrons, that is, they are suppliers or buyers: but at the same time they are owners of the organisation. There are several factors that contribute to members' commitment to the organization, such as the benefits that members receive (Osterberg & Nilsson, 2009); participation in the governance; and ability to translate members' needs into decisions (Fulton & Giannakas, 2001). Sustainability is a program's or project's ability to continue delivering intended services to their targeted audience over the long term, in keeping with their goals and objectives for their program.

In Kenya the Rockefeller Foundation funded two Cereal Banks projects in Western Kenya. One of these projects was the Maize Marketing Movement (MMM) project that was conducted by SACRED-Africa exclusively in Bungoma County between the years 2002 to 2005. This project resulted in the creation of five Local Cereal Banks (LCBs), based in separate village, and/or townships but linked to a Central Cereal Bank (CCB) in Bungoma. The second project was the Smallholder Marketing Movement (SMM) project that existed from July 2004 to 2006. It targeted the neighbouring Counties of Kakamega and Siaya. This project also involved

local NGOs in each County that included Resource Projects Kenya (RPK), Sustainable Community-Oriented Development Project (SCODP) and Rural Outreach Programme (ROP). The SMM project led to the creation of a further 19 LCBs out of which five were in Bungoma and 14 in Kakamega and Siaya Counties. These two projects resulted in the creation of a total of 25 CBs. However, all the 25 cereal banks created collapsed by the close of the year 2006 (SACRED-Africa, 2006).

In the year 2008, the Government of Kenya through the Ministry of Agriculture initiated Cereal Banking project which was funded by International Fund for Agricultural Development (IFAD) through the National Accelerated Agricultural Input Access Programme (NAAIAP) programme that aimed at uplifting the farmers to lead a better livelihood through farming. This project started on a mission of technology dissemination and adoption that would assist farmers to improve on their maize productivity hence good yields at the end. The farmers were also expected to form groups, sell their maize collectively through a cereal bank and save their money in banks which would in turn help them access loans to start up other income generating activities. The project in western region concentrated mainly on maize production since maize is mainly grown as a staple crop. Sub-counties covered by the programme included Kimilili, Bungoma South, Bumula, Sabatia, Butere and Hamisi. This project started in Kimilili Sub-county with the creation of 15 CBs. Given that in the past 25 cereal banks had collapsed in Bungoma County, it cannot be ascertained that the new ones will be sustained until factors affecting their sustainability are addressed. This study sought to investigate how access to extension services and level of participation in group activities influence sustainability of cereal banks in Kimilili Sub County.

Statement of the Problem

Globally, cereal banks are meant to prevent farmers from 'over-selling' at low prices and then buying back at high prices, to avoid exploitation by middlemen and help surplus producing farmers to find a better market for their grain. These cereal banking projects are examples of how farmers are adopting collective marketing initiatives and strategies and in the process to receive better prices for their produce. Despite the foregoing effort in establishment of cereal banks, their track record regarding sustainability has been poor (Catholic Relief Services (CRS), 1988). In Burkina Faso, it was estimated that out of the 1,500 cereal banks (CBs) created before 1991, at least 80 percent were bankrupt by 1997. Most CBs functioned acceptably for two or three years, during which time they received intensive NGO monitoring and subsidies, but subsequently decayed, with the amount of their stocks decreasing annually.

In Kenya, the Rockefeller Foundation funded two CBs projects in the year 2002 in Western Kenya resulting to the creation of a total of 25 CBs. However, all the 25 cereal banks created collapsed by the close of the year 2006 (SACRED-Africa, 2006). As an intervention, in the year 2008, the Government of Kenya through the Ministry of Agriculture initiated Cereal Banking project which was funded by International Fund for Agricultural Development (IFAD) through the National Accelerated Agricultural Input Access Programme (NAAIAP) that aimed at uplifting the farmers to lead a better livelihood through farming. The Sub-counties covered by the programme included Kimilili, Bungoma South, Bumula, Sabatia, Butere and Hamisi. Despite the efforts by the NGOs, the Kenya Government and other civil society in establishing cereal banks in Bungoma County, these cereal banks have in the past continuously collapsed. The reasons behind their collapse have not been investigated in the area. Therefore, there was need to investigate the factors that led to the collapse of the former cereal banks in Kimilili Sub-county, in order to determine the factors that may affect sustainability of the cereal banks. The Study was guided by the following specific objectives;

- i) To establish influence of access to extension services on sustainability of cereal banks among maize farmer groups in Kimilili Sub-county.
- ii) To determine influence of level of participation in group activities on the sustainability of cereal banks among maize farmer groups in Kimilili Sub-county.

LITERATURE REVIEW

Sustainability of Cereal Banks

According to Murray and Ferguson (2001), assets are the building blocks of sustainable livelihood by which individuals and households develop their capacity to cope with the challenges they encounter and to meet their needs on a sustained basis. Primarily, cereal banks are meant to prevent farmers from 'over-selling' at low prices and then buying back at high prices, to avoid exploitation by middlemen and help surplus producing farmers to find a better market for their grain (Mukhwana, 2003). Food security in between harvests is a key indicator of sustainability of a cereal bank. For example in Chad CB was operating more like a permanent grain store where community members could store their harvest for a small monthly fee. The storage facility was an improvement on their traditionally built grain stores which are vulnerable to pests and fire and the community appreciated this facility. There was no management of the buying, stocking and selling of cereal during the hunger gap so it was not operating as a true cereal bank. There was some training given to a small team who kept stock records and were responsible for cleaning and the security of the stock (Dramane *et al.*, 2012). Farmers' scepticism bred through bitter past experience can only be reversed over time through the

examples set by successful, equitable local marketing associations. Lack of reliable market information is another challenge to the operations of a cereal bank.

Access to Extension Services

Kenya's agriculture is predominantly small-scale farming accounting for 75 percent of the total agricultural output and 70 percent of marketed agricultural produce. Production is carried out on farms averaging 0.2 to 3 hectares mostly on commercial basis (Ministry of Agriculture Strategic plan, 2008-2012, 2009). MOA strategic plan further observes that about half of Kenya's estimated population of 35.5 million people are poor with 7.5 million people living in extreme poverty while over 10 million people suffer from chronic food insecurity and poor nutrition. In recent years, it is estimated that at any one time, about two million people require food assistance. Despite this negative picture, the agriculture sector is expected to grow by at least 7% if Kenya is to attain the 10% economic growth rate as envisioned in the Kenya vision 2030 strategy paper (GOK Vision 2030, 2007). Therefore given the small land sizes for a majority of Kenyan farmers, it becomes impossible to increase production by increasing the cultivable land. The only way to attain food security and increase farm income for such farmers is to increase the productivity of their farms and embrace the concept of cereal banking (Muthoni, 2009). With increased production, the small holder farmers will have adequate food for consumption and a surplus for bulking since it becomes impossible to think of banking cereals when there isn't enough for consumption (Mwamfupe, 2015).

The National Agriculture Sector Extension Policy (GOK-NASEP, 2008) underscores the role of extension service in sharing knowledge, technologies, agricultural information and also linking the farmer to other actors in the economy. The term 'extension' is here understood to mean 'advisory and other services' that help rural families to make the best possible use of the productive resources at their disposal (Katz, 2002). The major role of agricultural extension in developing countries has been to disseminate technologies generated by public sector and research organizations through appropriate strategies such as demonstrations, field visits, farmers' meetings and use of media (Sulaiman, Hall & Raina, 2006; Olubandwa, Kathuri & Wesonga, 2011). Agricultural extension provide farmers with important information such as patterns in crop prices, new seed varieties, crop agronomic management practices and marketing. Exposure to such activities is intended to increase farmers' ability to optimize the use of their resources.

According to Olubandwa *et al.*, (2011), in Kenya like many other developing countries the farmer to extension staff ratio continues to remain high due to reduction of the number of extension staff through natural attrition and a freeze on new hiring. Consequently, the linear

extension model of research to extension to farmer is no longer tenable to help farmers cope with the more complex, increasingly knowledge-based farming needed to participate in highly competitive globalized agricultural markets. Farmers need the most current local and global information about consumer preferences, and from that, what to grow, when, where and how and where to market it for a profit (World Bank, 2011). The only way to provide information in this context is to use new e-agriculture resource platforms such as Kenya Agricultural Commodity Exchange (KACE) that will guarantee ease of access to information on real time at minimal information search costs (Kaddu, 2011). This implies that cereal banks with adequate stocks, access to reliable market information through real time information sources such as the Kenya Agricultural Commodity Exchange (KACE) can exploit these local markets for higher returns.

Empirical literature identifies post-harvest losses as one of the major challenges facing small holder farmers in developing economies. The Asian Development Bank in their working paper No 425 (ADB, 2014) report that in developing countries, more than 40% of the food losses occur at postharvest and processing levels. The paper further asserts that post-harvest losses in low-income countries are mainly connected to financial, managerial, and technical limitations in harvesting techniques, storage and cooling facilities, infrastructure, packaging and marketing systems. Findings by Dramane *et al.*, (2012) revealed that poor grain storage conditions were the main cause of cereal bank food losses in Niger, Mali and Chad. In Kenya the Ministry of Agriculture 2008 -2012 strategic plan established that presently 40 percent of agricultural production is lost through poor storage. Given that many small holder farmers are food insecure; equipping them with adequate skills to reduce food losses would ensure that all the food produced is either used for consumption or sold without any unnecessary losses. Moreover, appropriate training by extension service providers on post-harvest grain handling would guarantee proper grain storage and enable cereal bank management to retain stocks for longer in search of more profitable markets. This study therefore sought to establish how access to extension services through acquisition of knowledge on sustainable agricultural production, post-harvest management and marketing practices influenced sustainability of cereal banks in Kimilili Sub-county.

Level of Participation in Group Activities

Many scholars such as Bamberger & Cheema (1990) suggest the need to encourage active community participation at all levels of project design and implementation for sustaining those programs. They further assert that; community participation is one of the major contributing factors for sustained community project because without the community, the project cannot

stand on its own. The main activities of the group that encompass member participation in a cereal banks include buying maize from members and other farmers at reasonable prices and also storing cereals to ensure food security during lean seasons and marketing for better prices. Other activities include attending meetings; serving on committees; involvement in recruiting others; and patronage (Osterberg & Nilsson, 2009). Participation would be an important indicator in developing farmers' understanding and appreciation of an organisation (Gray, Kraenzle & USDA, 1998; Liu, 2016). Fulton (1999) defined member commitment as preference by members for something that is offered by the group and not by other alternative organization. Members of cereal banks are also patrons, that is, they are suppliers or buyers, but at the same time they are owners of the organisation. Their decisions to increase or reduce volumes and even withdraw have great implications on the cereal banks survival.

Group performance is measured in terms of the benefits or outcomes that groups generate to members, which may be tangible or intangible (Amudavi, 2005). The ability of a group to generate any of these instrumental benefits depend on the social structures internal to the group, determine the formulation and enforcement of rules and define the manner in which collective decisions and actions are made and implemented (Katz, 2002). Groups' benefits may also depend on their relationship with external agencies and organizations (Krishna, 2002) and on the range of services they provide to their members (Prokopy, 2005). Amudavi (2005) notes that belonging to a group does not necessarily assure equal distribution of benefits.

Burkey (1996) reported that group size has been noted to influence cohesiveness. He asserts that groups of less than ten members are unviable while those with more than twenty-five members quickly become unparticipatory. Experience from Botswana indicates that farmer groups should not exceed 40 members if they are to be manageable. Some other studies indicate that age, gender, education, training, access to off-farm income, household size and information sources may slow down the progress of farmers towards success (Muthoni, 2009; Nompozolo, 2000). This study sought to investigate how aspects of level of participation in group activities such as involvement in planning activities, group meetings, sharing of proceeds and group size influence sustainability of cereal banks in the study area.

RESEARCH METHODOLOGY

The study adopted a descriptive survey research design. The study targeted 942 farmers from maize farmer groups participating in cereal banking activities and four ward extension officers in Kimilili sub-county. The researcher adopted stratified proportionate sampling to get individual farmers from the cereal banking groups. The advantage with stratified proportionate sampling is that it ensures inclusion in the sample of every sub group (Kothari, 2004) and also reduces

sampling errors (Kasomo, 2006). The ward extension officers were purposively sampled for interview to give a more detailed account of cereal bank operations and any challenges that could affect their survival in the study area. According to Mugenda (2003) a sample size of 10% - 30% of the total population is adequate for a study in descriptive research. This research adopted 20% of the target population of 942 Maize farmers from the 15 Cereal banks in Kimilili Sub-County. This gave a sample size of 188 farmers. Primary data was collected using self-administered structured questionnaire with both closed and open-ended questions. The questions were designed on a likert scale of three to five items. Interview schedule was used to collect additional information from extension officers. Secondary data was collected using document analysis. A pilot study involving a random sample of 30 farmers from Kanduyi ward in Bungoma Sub-County to ensure reliability of the instrument. Kathuri and Pals (1993) indicated that the smallest number that can yield meaningful results is 10. Internal consistency reliability of the instrument was measured using Cronbach's alpha. According to Kothari (2004), a threshold of 0.7 or higher for an instrument is accepted as good and reliable. The reliability coefficient obtained was 0.77, therefore the instrument was found to be consistent and reliable. Content and construct validity was established by seeking the opinion of two experienced supervisors from the Department of Agricultural Education and Extension of Egerton University and peers. Responses to the questions were checked against the research objectives to ensure their relevance. Out of 185 questionnaires collected, 5 were discarded for being incomplete. The researcher ended up with 180 usable questionnaires which presented a response rate of 95.7% which was above the minimum recommended of 50%-70% therefore deemed adequate for analysis and reporting (Mugenda & Mugenda, 2003). Data was subjected to descriptive and inferential statistics using SPSS version 17.0.

RESEARCH FINDINGS AND DISCUSSION

The background information was sought by the researcher to establish the basis on which the respondents' opinions were based with a focus on sustainability of cereal banks. This study collected data from maize farmers and ward agricultural extension officers. The study findings revealed that most of the respondents were female and were between the ages of 36-50 years. In addition, majority of the respondents had attained at least primary education. Further majority of the respondents had below five acres for farming with most of the households having between six to ten members. On indicators of measuring sustainability of cereal banks most of the respondents cited that maize income had remained constant with a few indicating that their income had increased. Notably, some of the respondents cited that income from maize through the cereal banks had decreased. This may be attributed to lack of adequate market information

to enable them access high value markets. Furthermore, majority of the respondents indicated that the groups have been in existence for less than five years with only a few surviving for more than 10 years. This implies a low rate of transition of these cereal banks to the next level of growth where only a few are able to survive beyond five years. Similarly, most of the respondents indicated that their groups registered a decline in membership with only a few registering growth in membership over the last four years.

Access to Extension Services

The researcher sought to establish the respondents' contact with extension officers. Findings show that majority (80%) of the small holder farmers had accessed extension services against 20 percent who had not accessed. The National Agricultural Extension policy (2007) underscores the importance of access to agricultural extension service as it plays a vital role in sharing knowledge, technologies, agricultural information and also linking the farmer to other actors in the economy. In addition, respondents were presented with five questions on a Likert scale to state their level of agreement with the statement where SD= Strongly Disagree, D=Disagree, U= Unsure, A=Agree, SA= Strongly Agree.

Table 1: Maize Famers Perceptions on Agricultural Extension Service Aspects

Agricultural Aspect	Extension	n=180									
		SD		D		U		A		SA	
		F	%	F	%	F	%	F	%	F	%
Agronomic Practices for maize production		14	7.8	11	6.1	0	0	60	33.3	95	2.8
Sources of Farm inputs		7	3.9	49	27.2	2	1.1	101	56.1	21	11.7
Post-harvest handling practices		8	4.4	13	7.2	6	3.3	103	57.1	50	27.8
Access to Markets		63	35.0	36	20.0	15	8.3	63	35.0	3	1.7
Access to improved Agricultural Technologies		85	47.2	27	15.0	26	14.4	37	20.6	5	2.8

Findings as shown in Table 1 indicate that agricultural extension services have enabled the smallholder farmers' access information on various aspects of maize production. Specifically; majority (86.1%) of the farmers either strongly agreed (52.8%) or agreed (33.3%) that they had received adequate information on agronomic practices for maize production. On access to appropriate sources of farm inputs 67.8 percent either agreed or strongly agreed that they had received adequate information. This implies that majority were able to access farm input. Low productivity levels for most crops have been attributed to high costs of farm inputs particularly fertilizer and seed (Kenya Vision 2030, 2007). The government has therefore made deliberate

effort to avail subsidized fertilizer to farmers through the National Accelerated Agriculture Input Access Programme (NAAIAP) with the aim of reducing production costs (Kenya Economic Report, 2012). It is therefore anticipated that with high yields farmers are able to raise surplus for the market which can be sold through the cereal banks.

On post harvest handling practices 80 percent of the respondents either agreed or strongly agreed that they had received adequate information on post harvest handling of maize. The Asian Development Bank working paper No. 425 (ADB, 2014) reports that post harvest losses in developing economies are as high as 40 percent which impacts negatively on food security and farm income. The Kenya vision 2030 strategy paper also affirms this assertion that post harvest handling is a major challenge for a majority of Kenyan small holder farmers. With limited amount of cultivable farm available for production, reducing post harvest losses would ensure that all the maize harvested is used for consumption and the surplus surrendered to the cereal bank for bulking.

On access to markets, 55 percent of the farmers either disagreed or strongly disagreed that extension services had enabled them access adequate information against 36.7 percent who either agreed or strongly agreed. This implies that access to high value markets is still a challenge to the cereal bank members. Despite the fact that finding the market for maize was one of the main objectives of establishing cereal banks in western Kenya by SACRED- Africa (Mukhwana, 2003), other studies reveal that most cereal banks in developing economies have a “donor dependency syndrome” and fail to meet their objectives once the donor pulls out (Kent, 1998; Msaki, Regnard & Mwenda, 2015; Mwafupe, 2015). This is further explained by Muthoni (2009) who asserts that the situation of small scale farmers is made worse by the fact that they also lack business acumen to manage their cereal banks profitably. In addition the Kenya Economic Report (KER, 2012) reports that only 17 out of 47 counties produce enough domestic supply of maize to meet their consumption needs. This implies that cereal banks with adequate stocks of maize and access to transport services have an opportunity to sale to the maize deficit counties. Furthermore existence of the 30 percent procurement opportunities for women and the minorities (GOK, 2005) is another avenue whereby cereal banks can liaise with relief agencies and the department of special programmes to access government tenders to supply maize to the food insecure counties such as to the refugees, internally displaced persons and drought stricken areas. This would guarantee higher returns than the current practice where the cereal banks stock maize to be sold during the hunger season in their local markets.

According to Muthoni (2009), cereal banks are supposed to facilitate access to improved technologies. However, findings on access to improved agricultural technologies reveal that 62.2 percent of the farmers surveyed either strongly disagreed or disagreed that extension

services have enabled them access adequate agricultural technologies. These findings are supported by the Ministry of Agriculture (2009) in the Strategic Plan of 2008-2012 which found out that use of modern science and technology in production is still limited among small holder farmers in Kenya which is the main cause for low agricultural productivity. This has been attributed to inadequate credit to finance inputs and capital investment in agriculture. The report further indicates that, while the Agricultural Finance Corporation (AFC), the Cooperative Bank of Kenya and the co-operative movement, have made considerable efforts to provide affordable credit to farmers, the high interest rates make it impossible for most farmers to access credit. Moreover other studies such as Mwafupe (2015) and Dramane *et.al*, (2012) argues that limited operating capital makes it difficult for cereal banks to finance other activities. The problem of limited operating capital is further exacerbated by the fact that most cereal banks sold or lent grain to their clients below the prevailing market prices therefore they rarely make a profit (Kent, 1998). Occasionally cereal banks fund other activities but almost always by de-capitalizing their own revolving funds. Consequently, low use of agricultural technologies could be attributed to cereal banks lacking adequate resources to purchase improved technologies for the members without the risk of de- capitalization. Further, the researcher also sought to establish whether a relationship exists between access to extension services in terms of contact with extension officers and sustainability of cereal banks in terms of growth in maize income. A chi square test of independence was performed to test the Null Hypothesis; H_{01} : There is no statistically significant influence of access to extension services on sustainability of cereal banks among maize farmer groups in Kimilili Sub-county.

Table 2: Chi-Square Test (Contact with Extension Officers by Maize income)

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.084^a	2	.006
Likelihood Ratio	10.126	2	.006
Linear-by-Linear Association	4.401	1	.036
N of Valid Cases	180		

. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.60.

Chi square test for the association between contact with extension staff and growth in maize income obtained a value of 10.084 with 2 degrees of freedom and a significance probability of less than 0.006 which is less than the conventional cut off point of 0.05. This implies that access to extension services has a significant impact on the income from maize by farmer groups in Kimilili Sub- County. Hence, the null hypothesis (H_{01}); *No significant relationship exists between access to agricultural extension and sustainability of cereal banks* was rejected. In addition, a

cross tabulation of agricultural extension services aspects and income from maize was also done and the results are given in Table 2. Findings show that there is a positive relationship between extension services and growth in maize income. Specifically; majority of the respondents whose income increased or remained constant either agreed or strongly agreed that they had adequate access to information on agronomic practices for maize production, appropriate sources of farm inputs and had knowledge on post-harvest maize handling practices. On the other hand, majority of the respondents either strongly disagreed or disagreed that they had adequate access to agricultural markets and improved agricultural technologies which had a negative impact on their maize income. These findings were supported by the ward agricultural extension officers who indicated that working capital was found to be a constraint to the progress of the cereal banks and main reason for low adoption of agricultural technologies. Consequently, out of the 37 respondents whose income from maize had decreased, over 67.6 percent disagreed that they had appropriate markets and agricultural technologies. Hence, the null hypothesis (H_{01}); *There is no significant relationship exists between access to agricultural extension and sustainability of cereal banks* was rejected. These findings indicate that a significant relationship exists between access to extension services and sustainability of cereal banks in terms of growth in maize income.

Table 3: Cross Tabulation of Access to Agricultural Extension aspects by Income from Maize (n=180)

Extension Service aspect		Growth in Maize income the last 4 years			
		Increased	Remained constant	Decreased	Total
Agronomic Practices	Strongly disagree	5	5	4	14
	Disagree	8	2	1	11
	Undecided	0	0	0	0
	Agree	15	27	18	60
	Strongly Agree	38	42	15	95
Total		66	76	38	180
Sources of Farm inputs	Strongly disagree	2	1	4	7
	Disagree	18	23	8	49
	Undecided	0	1	1	2
	Agree	33	45	23	101
	Strongly Agree	13	6	2	21
Total		66	76	38	180
Post harvest handling practices	Strongly disagree	5	2	1	8
	Disagree	10	1	2	13
	Undecided	1	2	3	6
	Agree	34	46	23	103
	Strongly Agree	16	25	9	50
Total		66	76	38	180

Access to Markets	Strongly disagree	21	30	12	63
	Disagree	16	14	6	36
	Undecided	3	5	7	15
	Agree	26	24	13	63
	Strongly Agree	0	3	0	3
	Total	66	76	38	180
Access to improved Agric Technologies	Strongly disagree	33	35	17	85
	Disagree	11	12	4	27
	Undecided	5	11	10	26
	Agree	17	15	5	37
	Strongly Agree	0	3	2	5
	Total	66	76	38	180

Table 3...

Level of Participation in Group Activities

Objective two sought to establish whether a relationship exists between the levels of participation in group activities and sustainability of cereal banks. Participation in group activities would be an important indicator in developing farmers' understanding and appreciation of an organisation. Members of organizations such as cereal banks are also patrons, that is, they are suppliers or buyers: but at the same time they are owners of the organisation. There are several factors that contribute to members' commitment to the organization or group, such as the benefits that members receive; participation in the governance; and ability to translate members' needs into decisions may influence sustainability of cereal banks. Results on group size indicate that, majority (66.7%) of the groups have a membership of more than 40 members while 24.4 percent had between 25-40 and 8.9 percent had below 25 members. According to Mwamfupe (2015) and Dramane *et al* (2012), group size has been found to influence cohesiveness. They assert that small groups operated as common interest groups have been found to perform better in terms of commitment to cereal bank activities. However, Mwamfupe cautions that few members with small grain deposits may threaten the adequacy of cereals for bulking and also small groups tend to serve interest of a few individuals which may fail to achieve the main social objective of cereal banks of achieving food security for a community. Burkey (1996) reports that group sizes of less than 10 members are unviable while those with more than twenty five members quickly become non-participatory. On the other hand Heinrich (1993) from studies done in Botswana conclude that groups should not exceed 40 members if they are to be manageable. These studies therefore reveals that a group size of forty members is ideal in terms of providing adequate stocks for bulking while at the same time ensuring that the groups remain manageable.

The study also sought to find out whether the group undertook any other activities apart from cereal banking. Findings indicate that most of the groups participated in table banking

(43.9%), merry go round (30%) and dairy farming (10%) as the main income generating activities other than cereal banking. Group performance is measured in terms of the benefits or outcomes that groups generate to members, which may be tangible or intangible and there is a significant association between group performance and sustainability. The study sought to find out aspects on the level of participation in group activities and the results are shown in Table 4.

Table 4: Participation in Group Activities

Aspects on the level of participation	n=180									
	SD		D		U		A		SA	
	f	%	F	%	F	%	F	%	F	%
Planning and implementing group activities	29	16.1	73	40.6	5	2.8	50	27.8	23	12.8
Group meetings	24	13.3	68	37.8	2	1.1	42	23.3	44	24.4
Sharing of benefits accrued	27	15.0	59	32.8	5	2.8	53	29.4	36	20.0

Results on whether respondents were involved in group activities in Table 4 indicate that majority of the respondents (56.7 %) strongly disagreed or disagreed that they were involved in the planning and implementing of group activities. On the part of group meetings, majority (51.1%) strongly disagreed or disagreed that they fully participate in group meetings. On the sharing of group proceeds results were mixed; 49.4 percent either agreed or strongly agreed that they were involved in sharing of group proceeds, a significant number (47.8%) either strongly disagreed or disagreed. This means that there is need to improve the process of sharing group proceeds to the satisfaction of majority of the members since dissatisfaction can easily result to conflicts that may make the group to collapse. Participation in group activities has been found to increase member commitment and improve group cohesiveness; results reveal that the modal response on all the aspects of participation was disagree. This implies that majority of the cereal bank members were not involved in group activities which could result in mistrust among the group members hence threatening the group cohesion. According to Mwamfupe (2015) when members do not trust the management committees they tend to hold their stocks rather than depositing to the banks which ultimately affects sustainability in terms of adequate stocks for bulking. This implies that improving participation may consequently improve commitment of the members to cereal bank activities.

On whether group size has any effect on the level of participation using cross tabulation. Respondents were presented with Likert scale to state their level of agreement with the statement where SD= Strongly Disagree, D=Disagree, U= Unsure, A=Agree, SA= Strongly Agree. The findings are summarized in Table 5.

Table 5: Cross Tabulation of Group Size by Participation in Group Activities

		Group size	SD	D	U	A	SA	Total
			%	%	%	%	%	
Planning and group activities	Implementing	<25	0	5.5	0	20	8.7	16
		25-40	24.1	15.1	20	36	30.4	44
		>40	75.9	79.4	80	44	60.9	120
Total			100	100	100	100	100	180
Group meetings		<25	0	4.4	0	9.5	20.5	16
		25-40	16.7	17.6	0	26.2	38.6	44
		>40	83.3	77.9	100	64.3	40.9	120
Total			100	100	100	100	100	180
Sharing of benefits accrued		<25	0	3.4	0	15.1	16.7	16
		25-40	14.8	16.9	0	35.8	30.6	44
		>40	85.2	79.7	100	49.1	52.8	120
Total			100	100	100	100	100	180

Findings as shown in Table 5 reveal that large group size negatively affects participation in group activities. Specifically; of the respondents who strongly disagreed that they were involved in planning and implementing of group activities 75.9 percent were from groups of more than 40 members while none was from the groups with less than 25 members while of the respondents who disagreed 79.4 percent were from groups of more than 40 members. On involvement in group meetings, of those who strongly disagreed 83.3 percent were from groups with more than 40 members with none from groups of less than 25 members. Of the respondents who disagreed 77.9 percent were from groups with more than 40 members while only 4.4 percent were from groups with less than 25 members. Results on whether respondents were involved in sharing of proceeds accrued, out of the respondents who strongly disagreed 85.2 percent were from groups with more than 40 members while out of the respondents who disagreed 79.7 percent were from large groups. This implies that reducing the group size may improve group participation ultimately improving the sustainability of cereal banks.

The researcher also sought to establish whether a relationship exists between the level of participation in group activities and sustainability of cereal banks. This was in an attempt to test the second Null Hypothesis; H_{02} : *There is no statistically significant influence of level of participation in group activities on the sustainability of cereal banks among maize farmer groups in Kimilili Sub-County*. First, the researcher carried out a cross-tabulation of aspects on level of participation in group activities by income from maize was summarized in Table 6.

Table 6: Cross Tabulation of aspect on Level of Participation in Group Activities by Income from Maize (n=180)

Aspect on Participation	Level of	Growth in Membership the last 4 years				
		Increased	Remained constant	Decreased	Total	
Planning and group activities	Implementing	Strongly disagree	9	7	13	29
		Disagree	16	8	49	73
		Undecided	2	0	1	3
		Agree	19	9	24	52
		Strongly Agree	10	3	10	23
Total			56	27	97	180
Group meeting		Strongly disagree	6	3	15	24
		Disagree	16	9	43	68
		Undecided	0	0	2	2
		Agree	22	6	14	42
		Strongly Agree	12	9	23	44
Total			56	27	97	180
Sharing of benefits accrued		Strongly disagree	7	3	17	27
		Disagree	15	9	35	59
		Undecided	0	0	5	5
		Agree	21	6	26	53
		Strongly Agree	13	9	14	36
Total			56	27	97	180

Findings as shown in Table 6 indicate that level of participation in group activities had an influence on growth in membership. Specifically; of the 56 respondents who said that membership in their groups had increased, majority either agreed or strongly agreed that they were involved in; the planning and implementing group activities, group meetings and sharing of group benefits. On the other hand of the 97 respondents who indicated that membership in their groups had decreased majority either strongly disagreed, disagreed or were undecided as to whether they were involved in; planning and implementing group activities, group meetings and sharing of benefits accrued. This implies that increasing the participation of members in group activities can improve their commitment and cohesion in the group which can attract the other farmers who are not members to join. Therefore, participation has a positive influence on sustainability of cereal banks in terms of growth in membership. According to Mwamfupe (2015), group size affects cohesiveness which eventually affects members' commitment and participation in group activities.

In addition, this study sought to establish whether there is any association between members' participation as portrayed in size of the group and sustainability of cereal banks as measured by maize income. A Chi Square test of independence was done to determine if a relationship exists between the size of the group and maize income and the results are summarized in Table 7.

Table 7: Chi-Square Tests (Group Size by Maize Income)

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	35.151^a	4	.000
Likelihood Ratio	36.890	4	.000
Linear-by-Linear Association	.184	1	.668
N of Valid Cases	180		

a. 1 cells (11.1%) have expected count less than 5. The minimum expected count is 3.29.

The results in Table 7 indicate that a chi square value of 35.151 with 4 degrees of freedom and a p value less than 0.001 was obtained. This shows that the size of the group seem to have a significant influence on the sustainability of the cereal bank in terms of income from maize. The second null hypothesis (H_{02}): *There is no statistically significant influence of level of participation in group activities on the sustainability of cereal banks among maize farmer groups in Kimilili Sub-County* was therefore rejected.

CONCLUSIONS

This study examined the influence of access to extension services and level of participation in group activities on sustainability of cereal banks among maize farmer groups in Kimilili Sub-County, Kenya.

Women in adult age mainly carried out maize cereal banking in the study area. Agricultural extension officers have enabled the maize farmer groups to access information on various aspects of cereal banking. However, access to high value markets and use of improved agricultural technologies is still a challenge to the group members in the study area due to lack of working capital. Maize farmer groups had a membership of more than 40 yet a group size of forty members is ideal in terms of providing adequate stocks for bulking while at the same time ensuring that the groups remain manageable. The cereal bank members were not satisfied with their level of involvement in activities and this can threaten group cohesion. This shows that big group size negatively affects participation in group activities ultimately influencing sustainability of cereal banks.

RECOMMENDATIONS

In order to address the problem of cereal bank sustainability in Kimilili Sub-County and based on the study conclusions the following recommendations were made;

- i. Government and donor agencies need to support women groups' especially those that deal with maize cereal banking.
- ii. The extension service providers in sub-county should focus on capacity building of farmers to enable them access vital market information, adopt new technologies to boost their production and improve income to ensure sustainability of cereal banks.
- iii. As a policy the County Government through the Ministry of Agriculture should ensure that all cereal banks are registered as self-help groups under the social services department with membership limited to 40 members to ensure that they remain manageable. These formal groups should then be sensitized to obtain loans from government agencies such as Uwezo Fund, Women Enterprise Fund and Youth Fund depending on their composition.

LIMITATIONS OF THE STUDY

Due to time and financial constraints, the research was limited to Kimilili sub county Kenya. However, to improve the external validity in terms of generalization of the study findings; It's recommended that this study be replicated in other counties dealing with cereal banking in Kenya. Moreover, as a result of the low literacy level and lack of management skills of the respondents the data collected was mainly qualitative in nature which made it difficult to use inferential statistics such as regression models to determine the impact of each factor on sustainability. Therefore the researcher mainly relied on descriptive statistics such as cross tabulations and chi square to test the relationships between independent and dependent variables.

SUGGESTIONS FOR FURTHER RESEARCH

Further research should be done to develop a model for adoption to guide the operations of cereal banks in the country which combines the social objective for the community and business principles to enable them make profit. Existing cereal banks have mainly been based on the social objective but have failed to sustain. Further, a study should be done on the role of monitoring and evaluation on sustainability of cereal banks.

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