Research application summary

Farmers' cooperatives practices and maize value chain in Uganda: A case of Masindi district

Nabimanya, J. B.,[1] Mukasa, H.B.,[2] Makumbi, O.[1] & Mbatudde, M. B.[1]

[1]Faculty of Environment and Agricultural Sciences, Ndejje University, P.O. Box 7088, Kampala, Uganda
[2]Faculty of Business Administration and Management, Ndejje University P.O. Box 7088, Kampala, Uganda
Corresponding Author: jbnabimanya15@gmail.com

Abstract

This study was inspired by the need to understand farmers' cooperatives and related factors that lead to value chain development of maize growing farmers in Masindi district, in Uganda. The aim of the study is to establish the relationship between farmers' cooperatives and the development of maize value chain in Uganda, focusing on selected farmers' cooperatives in Masindi district. The study used a mixed method design thereby randomly sampling 111 Rural Producer Organizations (RPOs) and purposely sampling six key informants including 1 district official, two Bomido Area Cooperative Enterprise executive officials, one warehouse operator and two agro-processors. We issued questionnaires to all 111 RPOs and interviewed six key informants. In addition, we reviewed relevant literature for further insight into behavior of variables. We cleaned all data, coded and subjected it to analysis. For quantitative data, descriptive statistics were obtained and carried out spearman's correlations and linear regression to establish relationships. For qualitative data, we used NVIVO software to map out key informants' responses. Findings revealed positive correlations between the development of maize value chain and the three predictor variables, i.e., coordination mechanisms (89.8%), corporate governance (67%) and inclusion of farmers groups in rural producer organizations (62.2%). The model predicted up to 85.45% of explained variability of development of maize value chain in Masindi. In addition, all individual predictors were statistically significant (corporate governance t = 4.18, p = 0.000; coordination mechanisms t = 11.01, p = 0.000, and farmer inclusion t = 4.66, p = 0.000) explained variations in the development of the maize value chain. Implications are, that it is imperative that corporate governance requires farmer Rural Producer Organizations' (RPOs) to engage multiple stakeholders at different levels of the value chains. Also there existed both vertical and horizontal coordination mechanisms in the value chain. This contributed to less chances to use cooperatives for development of maize value chain in Masindi. The findings suggest that farmers were driven by anticipated benefits of collectivization to join cooperatives. Therefore, farmers' cooperatives can be central players for accessing market and market information, better farming equipment and technology in the maize value chain.

Key words: Coordination mechanism, corporate governance, inclusion of farmers' groups, maize, Masindi, Uganda

Résumé

Cette étude a été inspirée par le besoin de comprendre les coopératives d'agriculteurs et les facteurs connexes qui conduisent au développement de la chaîne de valeur des agriculteurs cultivant le maïs dans le district de Masindi, en Ouganda. L'objectif de l'étude est d'établir la relation entre les coopératives d'agriculteurs et le développement de la chaîne de valeur du maïs en Ouganda, en se concentrant sur les coopératives d'agriculteurs sélectionnées dans le district de Masindi. L'étude a utilisé une méthode

mixte, échantillonnant ainsi de manière aléatoire 111 organisations de producteurs ruraux (RPOs) et échantillonnant à dessein six informateurs clés, dont un fonctionnaire du district, deux responsables de l'entreprise coopérative de la région de Bomido, un opérateur d'entrepôt et deux agro-transformateurs. Nous avons distribué des questionnaires aux 111 RPOs et interviewé six informateurs clés. En outre, nous avons examiné la littérature pertinente pour mieux comprendre le comportement des variables. Nous avons épuré toutes les données, les avons codées et les avons soumises à l'analyse. Pour les données quantitatives, nous avons obtenu des statistiques descriptives et effectué des corrélations de Spearman et une régression linéaire pour établir des relations. Pour les données qualitatives, nous avons utilisé le logiciel NVIVO pour cartographier les réponses des informateurs clés. Les résultats ont révélé des corrélations positives entre le développement de la chaîne de valeur du maïs et les trois variables prédictives, à savoir les mécanismes de coordination (89,8%), la gouvernance d'entreprise (67%) et l'inclusion des groupes d'agriculteurs dans les organisations de producteurs ruraux (62,2%). Le modèle a prédit jusqu'à 85,45% de la variabilité expliquée du développement de la chaîne de valeur du maïs à Masindi. En outre, toutes les variables prédictives individuelles étaient statistiquement significatives (gouvernance d'entreprise t = 4,18, p = 0,000 ; mécanismes de coordination t = 11,01, p = 0,000, et inclusion des agriculteurs t = 4,66, p = 0,000) pour expliquer les variations du développement de la chaîne de valeur du maïs. Les implications sont les suivantes : il est impératif que la gouvernance d'entreprise exige des organisations de producteurs ruraux qu'elles engagent de multiples acteurs à différents niveaux des chaînes de valeur. Il existe également des mécanismes de coordination verticale et horizontale dans la chaîne de valeur. Cela a contribué à réduire les chances d'utiliser les coopératives pour le développement de la chaîne de valeur du maïs à Masindi. Les résultats suggèrent que les agriculteurs ont été poussés par les avantages anticipés de la collectivisation à rejoindre les coopératives. Par conséquent, les coopératives d'agriculteurs peuvent être des acteurs centraux pour l'accès au marché et à l'information sur le marché, à de meilleurs équipements agricoles et aux technologies dans la chaîne de valeur du maïs.

Mots clés: Mécanisme de coordination, gouvernance d'entreprise, inclusion des groupes d'agriculteurs, Zea mays, Masindi, Ouganda.

Introduction

Maize production and consumption has been central for human survival across many countries. Maize was introduced in Uganda in the mid-19th century and has since become a major part of the farming system, ranking third in importance among the main cereal crops (finger millet, sorghum and maize) grown in the country (USAID, 2010). Uganda's small holder farmers have traditionally cultivated maize for food and for income generation and three-quarters of maize is grown plots of less than 0.5 hectares (USAID, 2010; Asea *et al.,* 2014). Maize being one of the major crops regionally exported and is considered key for poverty eradication (Private Sector Foundation Uganda (PSFU), 2005) but due to high post-harvest losses, this has not been achieved. However, the maize sub-sector is estimated to provide a livelihood for about 3 million Ugandan farm households, close to 1,000 traders and over 20 exporters (UBOS, 2011). The maize production is dominated by smallholder farmers whose production is generally characterized by small farm acreage (0.5- 5 ha) (MAAIF, 2013), low yields (1.0 -1.8 MT/ha) and high production costs and consequently low returns. Further, the quality of maize grain produced in Uganda is generally low and a lot is lost during the process of harvesting, transport, storage and processing. The major maize growing sub-regions in Uganda are Busoga (eastern), and Bunyoro (mid- western), (MAAIF, 2013). Masindi district has a population of 159,900 males and 153,200 females (UBOS, 2017) whose major economic activity is farming (UBOS, 2011). The highest proportion of the households grows maize (UBOS, 2011).

Cooperatives play a significant socioeconomic role by reducing transaction costs and by improving the bargaining power of individuals in all sectors including agriculture (Francesconi and Ruben, 2012). Agricultural cooperatives in particular are recognized as major tools to fight poverty especially in rural areas where more than 70 percent of the world's poor live (FAO, 2012). However, in previous studies, inconsistent findings about the performance and benefits of agricultural cooperatives have been reported, partially due to the indicators used and congruent with the varying nature of cooperatives. For instance, studies on Ethiopian coffee cooperatives have been addressing the benefits (mainly the socioeconomic benefits) of cooperatives to their members through ensuring fair trade, linking them to the markets, or by improving value chains (Kiranda, 2017). Cooperatives, are important engines for facilitating farmer coordination, fostering access to agricultural financing, increasing productivity, promoting collective bargaining and market access, and raising incomes, thus engendering poverty eradication (Kwakyewah, 2016).Thus with 80 per cent of its households engaged in agriculture, maize growing inclusive, Uganda has recently started to pay strong attention to the need to revive agricultural cooperatives as engines of poverty reduction and economic growth. During this study, the development of maize value chain was the dependent variable and farmers' cooperatives practices the independent variable.

Materials and Methods

This research used mixed methods design (both qualitative and quantitative study designs) to assess the role of farmers' cooperatives in the development of maize value chain. A cross-sectional study approach was adopted, which predominantly uses questionnaires or structured interviews for data collection with the intent of generalizing from a sample to a population (Creswell, 2003). Under the aspect of mixed methods, this research combined quantitative and qualitative research techniques and methods to provide the best understanding of the research problem.

Mixed methods employ strategies of inquiry that involve collecting data either simultaneously or sequentially to best understand research problems (Creswell, 2003). Quantitative research employs numerical indicators to ascertain the relative size of a phenomenon and involves counting and measuring of events as well as performing the statistical analysis of a body of numerical data (Smith, 1988). Qualitative approaches on the other hand are concerned with expression of attitudes, opinions and feelings. They allow a researcher to solicit information that cannot be expressed in numerical format, making it possible to obtain non-numerical information about the phenomenon under study to aid establish patterns, trends and relationships from the information gathered (Mugenda and Mugenda, 1999). The quantitative method was administered by the used of questionnaire while the qualitative methods used key informant interviews and documentary reviews. The study used simple random sampling and purposive sampling techniques. Simple random sampling was used to select farmers in the selected cooperatives and every farmer had equal chances of being selected. Purposive sampling was utilized to select warehouses operators, members ofthe growing boards from Rural Producer Organizations, Officials from the district production and commercial departments. The number of respondents were 111 maize growers from six out of 10 RPOs, one warehouse operator, two Bomido ACE board members, two Agro-processors, and one District Agriculture Extension and Commercial officer. This is because respondents were those directly involved in the maize value chain management.

Data collection, validity and reliability. Data were collected from primary sources such as the maize farmers or growers, district agriculture and commercial officials. Survey methods were used. A structured questionnaire and Key informant interviews and focused group discussions were used to collect data. This data was used to test the psychometric properties of the questionnaire. A pilot study was also carried out to identify any ambiguities, misunderstanding or inadequacies in the

survey instruments (Amin, 2005).

The researcher prepared research instruments were subjected to validity tests before finally administering them on respondents. The Content validity was determined by having items on the instrument rated by five (5) experts. The Content Validity Index (CVI) was determined by the formula:

$$CVI = \frac{\text{Number of items considered valid}}{\text{Total number of items}}$$

A CVI of 0.7 and above for any instruments was considered valid for the study in accordance with Amin (2005). All questions deemed not valid were edited or dropped per the recommendation of the experts.

To determine the reliability of the research instruments, a pre-test of the instruments was also undertaken in a similar environment using the same tools. The instrument was pretested once with 35 respondents, and the Chronbach's alpha was used to correlate the scores of the responses. Pilot data were used to help in enhancing the reliability of the questionnaire. Data from the pilot study were entered in the Statistical Package for Social Sciences (SPSS) and Cronbach's alpha coefficient test of reliability calculated using the formula below:

$$\alpha = \frac{K}{K-1} \left(1 - \frac{\sum_{i=1}^{K} \sigma_{Y_i}^2}{\sigma_X^2} \right)$$

Where σ_X^2 is the variance of the observed total item scores

And $\sigma_{Y_i}^2$ is the variance of component i for the pilot sample.

A Cronbach's Alpha of above 0.7 showed that the tool reliable. The higher the reliability coefficient, the higher the reliability of the instrument (Amin, 2005). Furthermore, the questionnaire contained simple-to-understand questions to avoid ambiguity or problems related to misinterpretation. Additionally, the formulation of the statements was kept simple to avoid any response biases by leading the respondents to agree or disagree with the statement. Finally, the layout of the questionnaire was condensed into a few pages since multiple pages likely to de-motivate the respondents from complying with the survey's most important requirement, i.e. the willingness of the respondents to respond in a motivated and genuine manner.

Results

Descriptive statistics. The results show that all respondents from three divisions (Miirya, Kigulya and Nyangahya) of Masindi Municipality belonged to Rural Producer Organization from here on referred to as (RPO) and all were involved in maize value chain. The RPOs included Kinuma, Tugume, Kalyango, Kyaba, Kigezi and Kahara. We explored characteristics of the age groups and the results are presented in Figure 1.
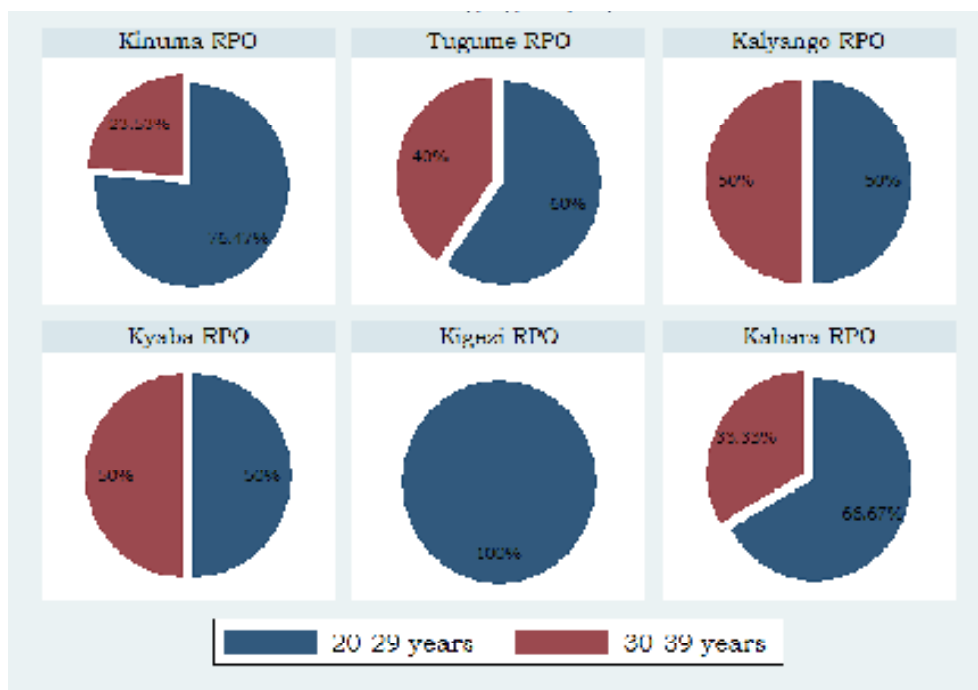
Figure 1. Pie chart of the distribution of age groups of maize farmers in different Rural Producer Organisation

Almost all respondents from the RPOs belonged to exclusively two age groups, 20-29 and 30-39 years of age. At Kigezi all members belonged only to 20-29 age group. Other RPOs had members belonging either of the two age groups. The most comon age of members of RPO was 20-29 years.

Level of education of respondents. Majority (46%) of the respondents from the six RPOs in Masindi were educated to certificate level and only 9% stopped at primary school level (Table 1). Kigezi RPO had the highest number (n = 36) of highly educated members with diploma and bachelors' certificates. The RPO with least number of educated members was Kinuma.

Maize farmer who are members of RPOs had varied experiences in the value chain with that the majority having over five years' experience as players in the maize value chain (Figure 1). In particular, all of Tugume RPO members had 5-10 years' experience in the value chain. On the other hand 50% of Kigezi RPO members had either 5-10 or 15-20 years. Fifty percent of members of both Kalyango and Kyaba RPOs had either <5 or 5-10 years experience.

Estimated acreage, status of the farmers and market for maize to RPOs. Farmers within different RPOs in Masindi had varied land sizes (Figure 2). On average, Kigezi RPO members had the highest land holdings of 7-10 acres (4-5 ha) for maize growing, closely following at 5-6 acres if Kalyango RPO (5-6 acres) and then Tugume and Kyaba with 3-4 acres. The RPO with lowest area under maize was Kinuma. On average Kinuma and Tugume RPOs belonged to farmer groups. With exception of Kinuma and Tugume, the other four RPOs' maize farmers identified themselves with cooperatives. They either worked with or belonged to one or more cooperatives. Figure 3, also shows that Kinuma and Tugume RPOs farmers sold their maize through traders while Kalyango, Kigezi and Kahara farmers sold though cooperatives. It was Kyaba farmers on the other hand sold their maize hrough middlemen.

Table 1. Level of Education of maize farmers in Rural Producer Organisation

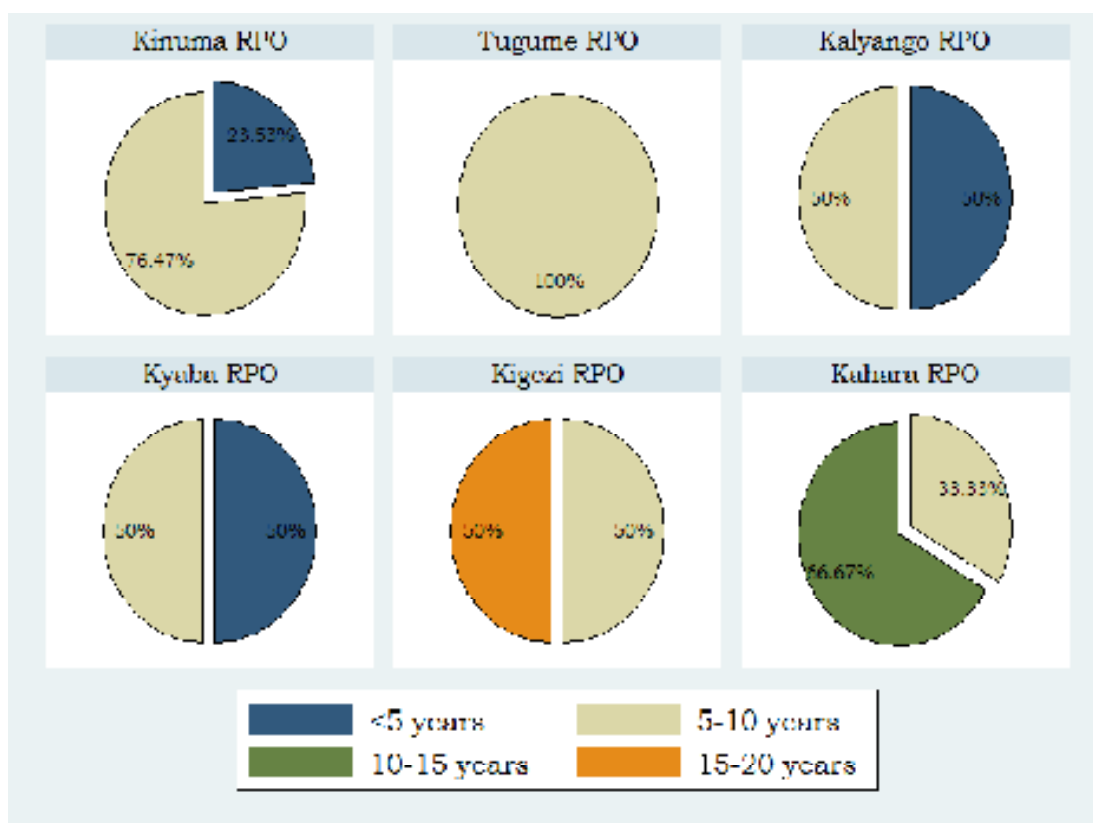| Rural producer organizations	Education status of maize farmers					Total
	Primary	Secondary	Certificate	Diploma	Bachelors	
Kinuma	4	7	-	-	-	11
Tugume	-	4	6	-	-	10
Kalyango	6	-	6	-	-	12
Kyaba	-	3	3	-	-	6
Kigezi	-	8	-	19	9	36
Kahara	-	-	36	-	-	36
Total	10	22	51	19	9	111
Percent	9%	20%	46%	17%	8%	100%

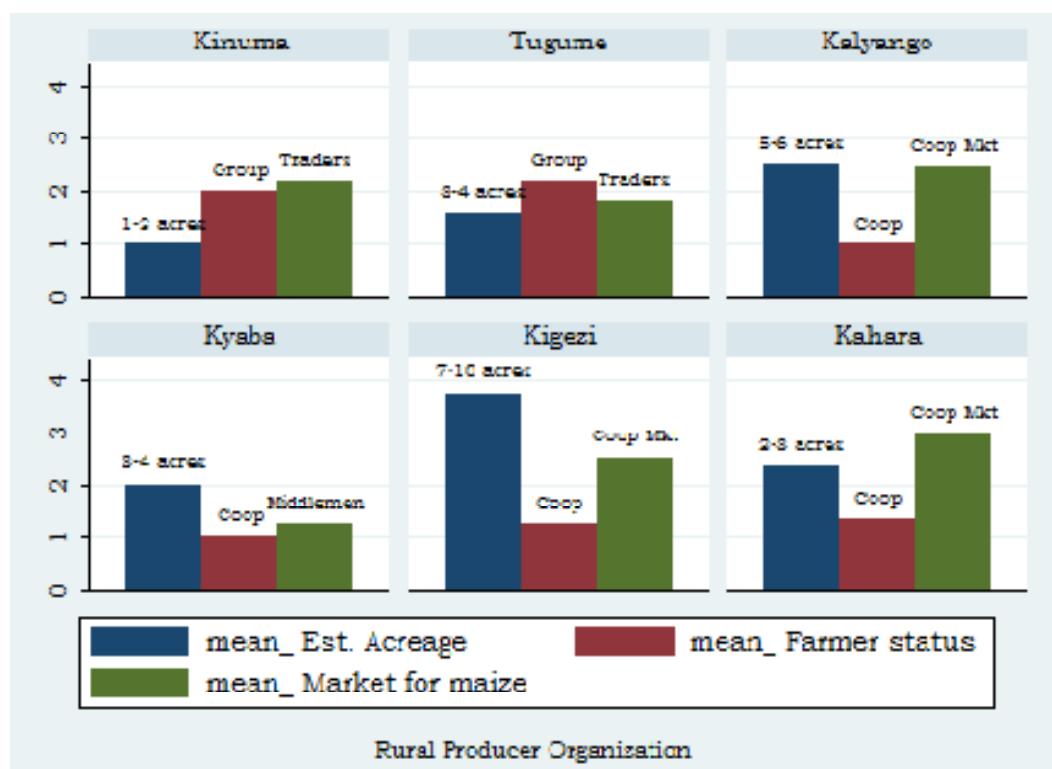**Figure 2. Experience maize farmers had in the maize value chain**

Figure 3. Estimated acreage held by farmers from different farmer producer organizations and where they sold their produce

Relationship between predictor variables and development of the maize value chain as the dependent variable. The regression results are presnted in Table 2. The linear regression established that corporate governance, coordination mechanisms and farmer inclusion, as predictors, were significantly predict development of the maize value chain, F(3, 92) = 186.97, p=.0000.

Table 2. Results of the linear regression of development of maize value chain against three predictors including corporate governance, coordination mechanism and inclusion of farmers groups

Source	SS	df	MS	Number of obs =96	
Model	33.7910125	3	11.2636708	F (3, 92)= 186.97	
Residual	5.54292082	92	.060242618		
Total	39.3333333	95	.414035088	Prob > F = 0.000	
				R-squared = 0.8591	
				Adj R-R-squared	
				Root MSB= .24544	
Maize value chain development	Coef	Std. Err.	T	p>|t|	[95% Conf. Interval]
Corporate_Governance	.2331058	.0557604	4.18	0.000	.1223608 .3438508
Coordination	.5522184	.0501523	11.01	0.000	.4526117 .6528251
Inclusion_farmers	.2302048	.0493776	4.66	0.000	.1321366 .3282729
_cons	-.2612028	.2012982	-1.30	0.194	-.6610585 .1385329

The predictors accounted for 85.45% of the explained variability in development of the maize value chain in Masindi Rural Producer Organizations. In addition, all individual predictors were statistically significantly (corporate governance t = 4.18, p = 0.000; coordination mechanisms t = 11.01, p = 0.000, and farmer inclusion t = 4.66, p = 0.000) and thus explained variations in the development of the maize value chain.

The positive correlation between development of the maize value chain and corporate governance was strong 0.6215 (see table 6). This implied that corporate governance influenced the changes in development of the maize value chain by up to 62.15%.

Relationship between development of the maize value chain and coordination mechanisms, inclusion of farmer groups and coordination governance. There was a very strong positive correlation (0.8982) between development of the maize value chain and coordination mechanism as depicted by Table 3. This implied that coordination mechanisms explained up to 89.8% changes in the development of maize value chain.

Table 3. Correlation of development of maize value chain and three predictors including inclusion of farmers' groups, coordination mechanism and corporate governance

	Development of maize value chain	Inclusion of farmers' groups	Coordination mechanism	Corporate governance
Development of maize value chain	1.0000			
Inclusion of farmers' groups	0.6215	1.0000		
Coordination mechanism	0.8982	0.5426	1.0000	
Corporate governance	0.6700	0.2413	0.6264	1.0000

Inclusion of farmers' groups explained 62% of the changes in the development of maize value chain. The least predictor variable was farmer group inclusion.

Discussion

The study examined the relationship between corporate governance of farmers' cooperatives and development of maize value chain in Masindi district. The results revealed a significant positive correlation implying that corporate governance affected the most maize value chain developed. Since smallholder farmers often lack basic knowledge of the marketing system, current price information, market conditions and bargaining power, they rely heavily leaders (governance structure).

This study further revealed a significant strong positive correlation (0.89%) between coordination mechanisms and development of the maize value chain. In the value chain, we note that farmers depended on inputs from input dealers to produce maize and marketed through various pathways. For instance, Kigezi RPO farmers had the largest (7-10 acres) land opened for maize production (see Figure 3), possibly because more maize used inputs from input dealers and sold through their cooperative. Typically, this is the way coordination was perceived in this study.

The study however, found that farmer inclusion in cooperatives had a weak positive correlation to development of the maize value chain (see Figure 3 and Tables 2 and Table 3). Though this relationship was the weakest amongst the three predictors, cooperatives are still relevant in developing the maize value chains and farmers paricipation is key.

Conclusion

The logical way to promote farmers' cooperatives and maize value chain sub sector is by focusing on growth potential supply chains. In this analysis government support and coordiantion to access input and market appeared key. Further, an emerging channel for market is the one that connects medium/large scale farmers who have started integrating value chain activities. Through these traders, processors and exporters, more small-scale producers could supply through the same channels. The main challenge is to have a collaboration strategy among the willing farmers to enhance competitiveness in the market.

Acknowledgement

References

Amin, M.A. 2005. Social Science research: Conceptions, methodology and analysis, Kampala: Makerere University Press.

Creswell, J. 2003. Research design: Qualitative, quantitative and mixed methods approaches. Sage: London.

Francesconi, G. N. and Ruben, R. 2012. The hidden impact of cooperative membership on quality management: A case study from the dairy belt of Addis Ababa. *JEOD* 1: 85-103.

Kiranda, A. 2017. Agricultural Cooperatives: Were they vehicles of political patronage or indispensable assets of agricultural transformation? A nuanced explanation of the success and failure of agricultural cooperatives in Uganda. *Journal of African Democracy and Development* 1 (2): 165-186. www.kas.de/Uganda/en/

Kwakyewah, C. 2016. Rethinking the role of cooperatives in African development. *Inquiries Journal* 8 (6): 1-5. Retrieved from http://www.inquiriesjournal.com/a?id=1419

Ministry of Agriculture, Animal Industry and Fisheries (MAAIF). 2013. Maize handbook for Extension workers, MAAIF: Entebbe Uganda.

Uganda Bureau of Statistics (UBOS). 2014. National population and housing census 2014: Provisional results, Kampala. http://unstats.un.org/unsd/demographic/sources/census/2010_PHC/Uganda/UGA-2014 11.pdf.

Uganda Radio Network (4th July 2013). https://ugandaradionetwork.com/story/poor-maize-harvests-in-masindi-worry-farmers.

USAID. 2010. Market assessment and baseline study of staple foods, Country Report-Uganda. USAID.