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THE EFFECT OF TRANSACTION COSTS ON POST-HARVEST MAIZE VALUE CHAIN PERFORMANCE AMONG MAIZE SMALLHOLDER FARMERS IN TANZANIA

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Abstract:
Agriculture has been the backbone of most developing countries' economy as it contributes significantly in their Gross Domestic Product and export earnings. However, its performance is still not satisfactory as the sector is hindered by many constraints one being high transaction costs. This study examines the effect of transaction costs on post-harvest maize value chain performance among Kongwa District Council maize smallholder farmers in Dodoma region. The study adopted a survey research design where a sample of 88 respondents obtained through multi stage sampling was used in the study. Questionnaires and Interview were used as data collection tools whereas multiple regression technique was applied to establish the existence of the hypothesized relationship. It was revealed that transportation and middlemen costs affected post-harvest maize value chain performance in terms of profits, output sales and post-harvest losses in the area while information costs did not. Moreover, multiple regression revealed that profit earned by farmers was the major effect of transaction costs on post-harvest maize value chain performance while post-harvest losses was not. The study recommends to the government and all associated stakeholders to take various measures focusing on reducing transaction costs such as improvement of transportation infrastructures and establishment of well-equipped market areas near farmers.

Keywords:
Transaction costs, post-harvest value chain, performance, smallholder farmers, maize

1. Introduction

1.1. Background Information

Agriculture is the bed rock of every country economic sector because it plays a major role in providing food for the population, employment opportunities, export earnings and high contribution to the nation's Gross Domestic Product (Oparinde and Daramora, 2014). In the world, agriculture employs about 40% of the active population globally and it persists to be a strategic sector in the development of most developing countries where more than 60% of the population in sub-Saharan Africa, Asia and the Pacific is highly dependent on it while in Latin America and high income economies the ratios are estimated at 18% and 4%, respectively (World bank, 2006).

In almost all African economies, agriculture is one of the important and crucial sector for attaining economic growth and is a key sector in ensuring poverty reduction at both household level and country level (Jagwe et al., 2010). According to Leyaro and Morrisey (2013) the sector is viewed as a main vehicle in any national economic strategy for combating poverty and hence gives a need for increased agriculture productivity. However, apart from its significant contribution in the country economy, and although the demand for agriculture products continue to increase the sector has been faced with several constraints and the production of both food and cash cops has remained stagnant or has increased at a very slow rate (Kaini, 2004).

Maize is one of the key important cereal food crops in agriculture economy in the world and used as both staple food for human beings, feed for animals and other industrial raw materials (Simiyu, 2014). Maize ranks third position next to wheat and rice in the world with respect to area while its productivity surpasses all other cereal crops. Maize

is grown in 70 countries of the world (Patil et al., 2007). And it is one of the world's leading crops cultivated over an area of about 142 million hectares with a production of 637 million tons of grain (Kaini, 2004; Maziku, 2019).

In order to ensure that maize production achieves its objectives and perform satisfactory, what is produced in one area need to be consumed in another area, where a product moves from the producer to the consumer incurring a number of transformations and transactions along a chain of interrelated activities called value chain in which value is added successively at each stage and various costs incurred at each transaction (Sitko et al., 2011). At each stage of transformation and transaction various costs are incurred which acts as constraint towards the value chain performance making high transaction costs to be a common and key constraint towards crop value chain performance in developing countries (Okoye et al., 2016; Patil et al., 2007; Eskola, 2005).

Moreover, Alam and Kausar, (2016) stipulated that in developing world although maize production is increasing at a satisfactory rate, the crop value chain performance is still not satisfactory due to high transaction costs. This is due to the fact that majority of the farmers reside in remote areas characterised with poor transportation and market infrastructures, presence of middlemen and lack of reliable information on market and potential exchange partners leading to high transaction costs making it a major constraint towards farmers to full participate in the market thus, hindering the transfer of the commodity from surplus area to shortage area (Key et al., 2000; Oumaet al., 2009; Alam and Kausar, 2016).

According to Musah et al., (2014) access to market information is among the transaction cost variable that affect farmers market participation and the value chain performance, caused by existence of many layers and poor connections between producers and consumers. Information standards and quality assurance present a major challenge at many points in the maize value chain leading to high transaction cost (Wilson and Lewis, 2015). This makes information access to be costfull affecting contract and transactions undertaken by farmers (Jagwe et al., 2010). Information related costs constitute 70 percent of the total transaction costs, which is 15 percent of the total production cost incurred by the farmers (Silva et al., 2008).

Furthermore, along the crop value chain transportation is an important factor in agricultural development all over the world as it is the only means by which food produced at farm site is moved to different homes as well as markets (Tunde and Adeniyi, 2012; Jagwe, 2011). However, when road quality is poor, long distance from farm to market and transport means are not readily accessible, transport costs tend to be higher leading to transportation costs being a major component of transaction costs affecting agriculture (Canwat, 2014; Jagwe, 2011). Consequently, high transportation cost is among the long term recognized source of agriculture inefficiency and as despite of decreasing the profit of farmers selling commodities to traders, but also often cause non existence of markets in rural areas (Suzuki and Sexton, 2005).

Moreover, due to barriers of farmers' access to market information as well as poor transport infrastructure it has made the farmers to rely on middlemen in getting market information and selling their crops and thus incur middlemen costs (Ismail et al., 2015; Mwagike and Mdoe, 2015). Middlemen costs is a kind of transaction costs incurred by farmers in form of charges paid by smallholder farmers in order to access information and other market procedures due to the fact that middlemen are the ones with accurate information on prices and arrival of buyers (Ismail et al., 2015).

According to Patil et al., (2007) high transaction costs has various negative impacts on maize value chain which include smallholder farmers to not fully participate in the market, lower farmers income, less contribution of agriculture to economic growth and post-harvest losses which are approximately 7-10 per cent at the farm to market level and addition 4-5 per cent at market and distribution level, making the amount of maize losses around 3-4 million tonnes of maize which is 4% of the total grain loss.

As a consequence, with the increasing concern with regards to reducing poverty in the world, lowering transaction costs within the value chain is one of the key elements to ensuring growth in agriculture which will in turn have a significant impact in reducing poverty (Silva et al., 2008). And, in order to make a significant contribution to economic growth, the sector needs to be commercialized to enable smallholder farmers to fully participate in markets and enabling improvement in value chain through reduction in transaction costs (Jagwe et al., 2010). And therefore, this paper focuses on addressing transaction costs affecting post-harvest maize value chain performance specifically transportation costs, information access costs and middlemen costs; its impact on maize post-harvest value chain performance in terms of sales volume, profit and post-harvest losses and; suggesting ways to overcome in Kongwa District Council (KDC). The findings of the study serves as inputs to agriculture policy makers and

associated stakeholders to formulate various strategies of improving the maize value chain through reduction of transaction costs which lead to agriculture improvement hence poverty reduction and an increase in national income.

1.2 Problem Statement

Maize is the most important food crop in the country and the main subsistence crop grown by more than 50 percent of Tanzanian farmers and ranks the 5th among all agricultural commodities grown (Maziku, 2019). Tanzania is considered to be a potential maize producer for the whole east African and enables the country to be ranked among the top 25 maize producing countries in the world (Barreiro-Hurle, 2012; Abate, 2014). However, despite the significance of the crop to the country and people economy and wellbeing, post-harvest maize value chain performance is still low and faced with several constraint one being high transaction cost (Ismail et al., 2015).

Transaction costs refer to the proportional or fixed costs incurred during market exchange (Azam et al., 2014). According to Eskola (2005) and Sendall (2007) high transaction costs is a well-known problem in the developing world including Tanzania and is among the challenges affecting farmers and the crop value chain as a whole. In the country maize value chain is faced with various transaction costs such as high transportation cost, local production taxes paid to the government and to the market, maize markets and market information system as well as obtaining service from the middlemen (Wilson and Lewis, 2015; Ismail et al., 2015).

Tanzania farmers along the maize value chain face various transaction costs affecting post-harvest maize value chain performance which include information costs relating to seeking and gathering information and services which make farmers subjected to low prices and hence low profit (Ismail et al., 2015; Wilson and Lewis, 2015). Transportation costs leading to reduction in quality and high number of post-harvest losses in farm and on transit (Wilson and Lewis, 2015; Key et al., 2000). And middlemen costs which also make farmers subjected to low price and enlarge the gap between price paid to farmers and that to be received by middlemen (Ismail et al., 2015).

Hence, in order to reduce agriculture challenges both national and international initiatives should focus on reduction of transaction costs (Ouma et al., 2009). High transaction costs affect the whole value chain and has impact on farmers involvement in the agricultural market leading to poor market access and participation, the selection of channels and institutional arrangements for marketing, customers' fulfilment, affect price paid and received hence low profit, quality reduction and post-harvest losses on the farm and during transportation (Omiti et al., 2009; Key et al., 2000; Canwat, 2014; Wilson and Lewis, 2015; Ismail et al., 2015; Alama and Kausar, 2016).

Therefore, as among the challenges facing maize smallholder farmers in Dodoma region are high transaction costs specifically high transportation costs and lack of market information (URT, 2012). And, whichever effort to improve maize distribution through reduction in transaction costs will facilitate the improvement of welfare of majority Tanzanians (Ismail et al., 2015); this study was conducted to analyse the effects of transaction costs on post-harvest maize value chain performance where it hypothesised that there is a significant relationship between transaction costs and post-harvest maize value chain performance.

2. Research Methodology

2.1 Study Area and Target Population

This study was conducted in Dodoma region specifically at Kongwa district Council because Kongwa is the leading maize producing district in the region with a planted area of about 108,568 ha during 2007/2008 season (URT, 2012). Also in Kongwa district it is where the Kibaigwa International Grain Market (KIGM) belongs which is the largest international market in Tanzania where the market approximately collects between 74,205 to 116,205 Tons of maize annually (Ismail et al., 2015).

The target population of this study were the smallholder farmers households producing maize crop in Kongwa district Council in Dodoma region. The study targeted smallholder farmers because they are the ones who are highly affected with transaction costs as they are vulnerable to poor road infrastructure, long distance to the market, inadequate market information and weak institutional set up (Wilson and Lewis, 2015).

2.2 Research Design and Sampling Procedures

The study adopted a survey research design which enabled the researcher to gather data from several households at a particular period in time regarding the study topic. The strength of using survey lies on the fact that it enabled the researcher to collect data from a large population in an economical way, facilitated the establishment of relationship

between studied variables and generalization of the results to the population (Greener, 2008.). Also the design facilitates the collection of quantitative data which can be analysed by using both descriptive and inferential statistics (Saunders et al., 2009).

Multi stage sampling technique was adopted by the researcher to select the respective sample. In the first stage Kongwa district was purposively selected as it is the highest annual maize production district in the region comprising of largest maize planted area and highest number of smallholders farmers growing and selling maize crop (URT, 2012). In the second stage three villages were selected basing on the distance from KIGM namely Lengitojo, Makawa and Kibaigwa and lastly, maize producing smallholder farmer's households were randomly selected in each selected village from the list given by Village executive officers giving a sample size of 88 farming households. The researcher adopted this sampling technique from various authors who conducted related studies on agriculture and specifically maize crop including (Okoye et al, 2016; Musah et al.,2014, Oparinde and Daramola, 2014)

2.3. Data Sources and Methods

In this study both primary and secondary data were collected by the researcher. Primary data concerning respondents profile, transportation, middlemen and information costs incurred; factors influencing the given costs and effects of transaction costs on post-harvest maize value chain performance was collected directly from the smallholder maize farmers in the district through questionnaire and interview methods. Secondary data was collected from published and unpublished reports from various sources such as President Office-Rural Authority and Local Government (PO-RALG), Kongwa District Council office website, KIGM offices, bulletins, journals, research papers and articles relevant to the study. From the sources the researcher collected data on the district maize production status, prevailing market prices for several years, information on households growing maize crop, quantity for maize sold in the respective markets, information on how the market operates, transaction cost challenges facing farmers in the district and the mechanisms adopted to minimize the challenges and to ensure efficiency of the market operations.

2.4. Measurement of Variables

In the study transaction cost was attributed by Transportation, information and middlemen costs as the independent variables of the study. Transportation costs under this study is attributed by distance to the markets, quality of the roads and local availability of transport facilities, whereas, information costs is influenced by nature of information source, type of information sought and information costs causative factor. Also, the study depicts that frequency of sell through middlemen, type of middlemen costs incurred and middlemen cost causative are among the indicators of middlemen costs as part of transactions costs that affect the post-harvest maize value chain.

The dependent variable post-harvest maize value chain performance was measured by three indicators namely sales volume, profit and the quantity of post-harvest losses per bag of maize. These three were used as performance measures to determine the effect of transaction cost on performance of post-harvest maize value chain in the study. Sales volume was measured in bags of maize sold per farmer (Mwagike, 2015). Profitability as indicator of efficiency was measured as the difference between selling price and total post-harvest transaction costs incurred per bag of maize sold (Mwangi, 2015). Whereas, post-harvest losses were determined by the difference between bags of maize harvested versus the quantity of maize final used for consumption or sale (Canwat, 2014).

2.5. Data Analysis Methods

The study used both qualitative and quantitative method of analysis to analyse the collected data basing on the nature of the data collected in the study area .Qualitative data collected through interview were analysed through description, narrations, explanations and interpretations where by respondents responses were interpreted by the researcher and explained to make a meaning. Qualitative data focused on several themes including the type of transaction costs incurred, the main cause of incurring the given type of transaction costs and how did the costs affect post-harvest maize value chain performance.

Quantitative data collected through questionnaire was analysed in form of descriptive and inferential statistics. The descriptive statistics involved the use of frequency distribution tables where frequencies and percentages basing on respondents responses were displayed. Type of responses, frequencies and percentages of the responses regarding transaction costs on post-harvest maize value chain performance in KDC smallholder farmers were analysed. This enabled the researcher to describe and make comparison of the variables in numerical means (Saunders et al., 2009). The inferential statistics entailed the testing of hypotheses by using several tests of significance to determine at what

level of validity conclusion from the sample can be drawn (Kothari, 2004). In the study the researcher used chi-square tests and multiple regression analysis as the selected types of inferential statistics.

Multiple regression analysis was used to determine the effect of transaction costs on post-harvest maize value chain performance as adopted by other scholars who conducted similar studies of assessing the effects of independent variables on the dependent variable (Mwagike, 2015; Mwangi, 2015).

Multiple regression assumptions namely normality, homoscadicity and mutlicollinearity were tested by the researcher before the conduct of the analysis to reduce over and under estimation of significance level or Type I and Type II error (Osborne and Waters, 2002).

In equation form the multiple regression model is presented as follows:

$$Y = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \varepsilon$$

Where Y= the dependent variable performance, X1, X2 and X3 represents the independent variables namely transportation costs, information costs and middlemen costs respectively, while β1, β2and β3 are variables coefficients of determination, ε is the error term estimated and α is the constant figure.

3. Results and Discussion

3.1 Transaction Cost on Post-harvest Maize Value Chain Performance

The study wanted to find out from respondents on whether transaction cost has impact on post-harvest maize value chain performance. Results indicated that 80% of respondents agreed that transaction costs has impact on post-harvest maize value chain performance, 2% responded No and 6% responded I don't know.

Table 1: Transaction cost impact on post-harvest maize value chain performance

Response	Frequency	Percent
Yes	80	90.9
No	02	2.3
I don't know	06	6.8
Total	88	100.0

Also, the study wanted also to find out among the three transaction costs namely transportation cost, information costs and middlemen costs which one has high impact on post-harvest value chain performance. The results indicated that transportation costs has high impact reported by 62.5% of respondent, middlemen costs by 30.7% of respondents and information costs by 6.8%. This implies that transportation costs is the highest transaction cost affecting farmers, followed by middlemen costs and lastly information costs.

Table 2: Transaction cost with high impact on post-harvest maize value chain performance

Response	Frequency	Percent
Transportation costs	55	62.5
Information costs	6	6.8
Middlemen costs	27	30.7
Total	88	100.0

Moreover, the study wanted to determine the main effect of transaction costs on post-harvest maize value chain performance. Table 3 indicated that 34.1% of respondent said that transaction costs has high effect on sales volume, 55.7% on profit earned by farmers and 10.2% leads to post-harvest losses. This implies that transaction costs incurred has high impact and affect profit earned by farmers that is the difference between post-harvest costs incurred and income earned.

Table 3: Main effect of transaction costs on post-harvest maize value chain performance

Response	Frequency	Percent
Has impact on sales	30	34.1
Has impact on profit earned by farmers	49	55.7
Leads to post-harvest losses	9	10.2
Total	88	100.0

3.2. Hypothesis Testing

Relationship between transaction costs and post-harvest maize value chain performance

The hypothesis of the study stated that:

H0 There is no significant relationship between transaction costs and post-harvest maize value chain performance.

H1 There is significant relationship between transaction costs and post-harvest maize value chain performance.

The researcher tested this hypothesis by examining the association between transaction costs and post-harvest maize value chain performance by using multiple regression technique. Each performance indicator variable namely profit, sales volume and post-harvest losses was tested against the three transaction costs variable namely transportation, information and middlemen costs to establish their association.

3.2.1. Model Analysis on Effect of Transaction Costs on Profit

Multiple regression analysis was used to determine the effect of transaction costs on profit indicator of post-harvest maize value chain performance. The post-harvest value chain performance was analysed in terms of transportation costs, information costs and middlemen costs as follows:

Table 4: Model Summary on effect of transaction costs on profit

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.691a	.477	.457	7.80634

a. Predictors: (Constant), transportation costs, information costs, middlemen costs

b. Dependent Variable: Performance

R square tells us how much variance of post-harvest value chain performance in terms of profit is explained by transportation costs, information costs and middlemen costs. From the findings in table 8 the value of R square was 0.477 indicating that there was variation of 47.7% on post-harvest value chain performance profit indicator due to changes in transportation costs, information costs and middlemen costs. From the findings shown in table 8 it is stipulated that there exists relationship between the study variables as shown by R value 0.691.

Table 5: ANOVA on effect of transaction costs on profit

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	4340.046	3	1446.682	23.740	.000[b]
	Residual	4753.234	78	60.939		

Total	9093.280	81			

a. Dependent Variable: performance

b. Predictors: (Constant), transportation costs, information costs, middlemen costs

The model is significant at F= 23.74 and P=0.000 indicating that post-harvest value chain performance profit indicator can be predicted by transportation costs, middlemen costs and information costs and signifying that there is a significant relationship between the studied variables.

Table 6: Coefficient Analysis on effect of transaction cost on profit

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	14.445	7.172		2.014	.047
	Transportation costs	-.572	.122	-.491	-4.695	.000
	Information costs	-.040	.049	-.068	-.812	.419
	Middlemen costs	-.946	.339	-.287	-2.793	.007

a. Dependent Variable: performance

From Table 6 it was revealed that holding transportation costs, information costs and middlemen costs, post-harvest value chain performance in terms of profit would be at 14.445. All factors were found to have negative regression coefficients (-β), indicating that they have negative impact on profit. A unit increase in transportation costs would lead to a decrease in profit by 0.491, a unit increase in information costs would decrease the profit by 0.068 and a unit increase in middlemen costs would decrease the profit by 0.287.

Transportation cost was found to have high effect to profit when other variables variances are controlled for as it has the largest Beta standardised coefficient of 0.491.

Only transportation costs and middlemen costs variables were significant as their significance value was less than 0.05 ($p<0.05$) indicating that transportation costs and middlemen costs are the main transaction costs with effect on profit indicator of post-harvest maize value chain performance and not the information costs.

3.2.2. Model Analysis on Effect of Transaction Costs on Sales

Multiple regression analysis was used to determine the effect of transaction costs on sales indicator of post-harvest maize value chain performance. The post-harvest value chain performance was analysed in terms of transportation costs, information costs and middlemen costs as follows:

Table 7: Model Summary on Effect of Transaction Costs on Sales Volume

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics	
					R Square Change	F Change
1	.721[a]	.520	.511	.558	.520	59.120

a. Predictors: (Constant), Transportation costs, information costs, middlemen costs

b. Dependent Variable: Performance

R square tells us how much variance of post-harvest value chain performance in terms of sales is explained by transportation costs, information costs and middlemen costs.

From the findings in table 7 the value of R square was 0.520 indicating that there was variation of 52% on post-harvest value chain performance sales indicator due to changes in transportation costs, information costs and middlemen costs. From the findings shown in table 4.35 it is stipulated that there exists relationship between the study variables as shown by R value 0.721.

Table 8: ANOVA on effect of transaction costs on sales volume

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	55.217	3	18.406	59.120	.000[b]
	Residual	51.058	164	.311		
	Total	106.275	167			

a. Dependent Variable: performance

b. Predictors: (Constant), transportation costs, information costs, middlemen costs

The model is significant at F= 59.12 and P=0.000 indicating that post-harvest value chain performance sales indicator can be predicted by transportation costs, middlemen costs and information costs and signifying that there is a significant relationship between the studied variables.

Table 9: Coefficient Analysis on effect of transaction cost on sales volume

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.400	.209		1.915	.057
	Transportation costs	-.520	.117	-.595	-4.448	.000
	Information costs	-.013	.122	-.015	-.110	.913
	Middlemen costs	-.423	.060	-.383	-7.008	.000

a. dependent variable: Performance

From Table 9 it was revealed that holding transportation costs, information costs and middlemen costs, post-harvest value chain performance in terms of sales volume would be at 0.4. All factors were found to have negative regression coefficients (-β), indicating that they have negative impact on sales volume. A unit increase in transportation costs would lead to a decrease in sales by 0.595, a unit increase in information costs would decrease the sales by 0.015 and a unit increase in middlemen costs would decrease the sales by 0.383.

Transportation cost was found to have high effect to sales when other variables variances are controlled for as it has the largest Beta standardised coefficient of 0.595.
Only transportation costs and middlemen costs variables were significant as their significance value was less than 0.05 ($p<0.05$).

3.2.3. Model Analysis on Effect of Transaction Costs on Post-harvest Losses

Multiple regression analysis was used to determine the effect of transaction costs on post-harvest losses as a post-harvest maize value chain performance indicator. The post-harvest value chain performance was analysed in terms of transportation costs, information costs and middlemen costs as follows:

Table 10: Model Summary on effect of transaction costs on post-harvest losses

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.734[a]	.538	.530	.547

a. Predictors: (Constant), Transportation costs, Information costs, middlemen costs

b. Dependent Variable: Performance

R square tells us how much variance of post-harvest value chain performance in terms of post-harvest losses is explained by transportation costs, information costs and middlemen costs. From the findings in table 4.38 the value of R square was 0.538 indicating that there was variation of 53.8% on post-harvest value chain performance post-harvest losses indicator due to changes in transportation costs, information costs and middlemen costs. R is the correlation coefficient which shows the association between the study variables. From the findings shown in table 4.38 it is stipulated that there exists relationship between the study variables as shown by R value 0.734.

Table 11: ANOVA on effect of transaction costs on post-harvest losses

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	43.743	3	14.581	38.022	.000[b]
	Residual	63.276	165	.383		
	Total	107.019	168			

a. Dependent Variable: Performance

b. Predictors: (Constant), Transportation costs, Information costs, Middlemen costs

The model is significant at F= 38.022 and P=0.000 indicating that post-harvest losses performance indicator can be predicted by transportation costs, middlemen costs and information costs and signifying that there is a significant relationship between the studied variables.

Table 12: Coefficient Analysis on effect of transaction cost on post-harvest losses

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.091	.213		5.128	.000
	Transportation costs	-.515	.131	-.590	-3.944	.003
	Information costs	-.187	.065	-.174	-2.865	.075
	Middlemen costs	-.015	.136	-.016	-.108	.914

a. Dependent Variable: Performance

From Table 12 it was revealed that holding transportation costs, information costs and middlemen costs, post-harvest value chain performance in terms of post-harvest losses would be at 1.091. All factors were found to have negative regression coefficients (-β), indicating that they have negative impact on post-harvest losses. A unit increase in transportation costs would lead to a decrease in post-harvest losses by 0.590, a unit increase in information costs would decrease the post-harvest losses by 0.174 and a unit increase in middlemen costs would decrease the postharvest losses by 0.016. Transportation cost was found to have high effect to post-harvest losses when other variables variances are controlled for as it has the largest Beta standardised coefficient of 0.590. Only transportation costs variable was significant as their significance value was less than 0.05 ($p<0.05$).

In the study the three transaction costs variable namely transportation costs, middlemen costs and information costs were tested on their effect on the three post-harvest performance indicators namely profit, sales and post-harvest losses. From the study most respondents (90.9%) agreed and were aware that transaction costs have impact on post-harvest maize value chain performance. This supports Alam and Kausar, (2016) study which stipulated that in developing countries despite the fact that maize production is escalating at a satisfactory rate, the crop value chain performance is still not adequate due to high transaction costs.

Among the three transaction costs variables used in the study transportation costs was found to be the main contributor of high transaction costs incurred by farmers as it had the significant relationship with all the three post-harvest maize value chain performance indicators namely profit, sales and post-harvest losses. This was supported by frequency table presentations which indicated that transportation cost is the main transaction cost affecting post-harvest maize value chain performance in terms of sales volume, profit and post-harvest losses due to unfavourable transportation variables present in the study area including long distance to the market and poor quality of the roads. This supports the studies of Canwat (2014) and Jagwe (2011) which indicated that when road quality is poor, great distance from farm to market and transport means are not easily available, transport costs tend to be high making transportation costs being a major component of transaction costs affecting agriculture.

However, information costs was found to have less impact on post-harvest maize value chain performance in the study area. This opposes the study of Silva et al (2008) which found that information related costs constituted 70 percent of the total transaction costs, which is 15 percent of the total production cost incurred by the farmers. And supports Alam and Kausar (2016) study that information costs is unobservable type of transaction costs which may be difficult to be noticeable during the given transaction.

Moreover, among the three post-harvest maize value chain performance indicators used in the study namely profit, sales volume and post-harvest losses; Transaction costs incurred by farmers was found to affect more the profit indicator as it affected the profit incurred by smallholder farmers in the study area more than the other two indicators. This is in line with the study of Nkhori (2004) which indicated that transaction costs affect profit earned by farmers which consequently affect farmer's income. This was emphasized by respondents through interview that in the past they had wide market from other East African countries especially Kenyan traders who were buying crops at favourable prices (the average price was between 550 to 650 Tshs) making the transaction cost impact on profit not very high observed as the revenue received was reasonable; but, currently they rely only on local traders who due

to the country economic condition they pay a very low price (usually ranging from 350-400) making the output profit after the deduction of transaction costs from the revenue to be very low. For example during the survey data the average price for 1 kg of maize ranged from 385-390Tshs with uncertainty of falling due to an increase in maize harvests unlike past years were it was reported to reach 600Tshs.

Generally, the study revealed that the transaction costs incurred by farmers made them earn less profit than anticipated, affect the level of sales volume and sometimes lead to post-harvest losses which all act as restraints on post-harvest maize value chain performance. This supports the transaction costs theory which state that there is always economic costs on each transaction incurred between the parties which calls for various mechanisms to be undertaken to reduce the impact of the costs (Abdul-Halim et al., 2012). Also, this finding supports the studies of Sendall (2007) and Eskola (2005) who found that costs incurred at each stage of transactions act as constraint towards value chain performance making high transaction costs a main hindrance towards crop value chain in developing countries.

4. Conclusion, Recommendation and Policy Implication

4.1 Conclusion

From the findings transportation and middlemen costs were proved to have significant relationship and affected post-harvest maize value chain performance in terms of sales volume by decreasing the number of maize bags sold and profit earned by smallholder farmers by reducing the residual income after cost deduction. However, despite the fact that farmers incur a little amount of information costs the study failed to establish a clear relationship between information costs variables and post-harvest maize value chain performance. Also it is proved that among the three types of transaction costs transportation costs was found to affect all the three post-harvest maize value chain performance indicator and was found to have significant relationship with all the three post-harvest performance variables.

Based on the findings, the study concluded that transaction costs have negative impact on post-harvest maize value chain performance in Kongwa District Council has it affect the performance in terms of profit earned by farmers, sales volume brought to the market and less leading to post-harvest losses. Thus, as maize is the leading cultivated crop in the area transaction costs made smallholder farmers not to gain the anticipated social and monetary benefits from the crop and hence calls for various efforts to be undertaken to ensure the costs incurred are reduced. Also, Findings of the study contributed to transaction cost theory as they were able to point out the major costs affecting post-harvest maize value chain performance which is in line with the theory focus of analysing the transaction costs and suggesting measures and mechanisms on how to reduce them

4.2 Recommendations

The study recommend on various mechanisms to be taken by the government and appropriate bodies to improve rural roads infrastructure to ensure they are passable during both seasons of the year as it would facilitate the improvement of quality of the roads hence reduction in transaction costs incurred by farmers.

Also, the Local Government Authorities to ensure the creation of favourable and well equipped marketing area near the villages so as to reduce the distance to be travelled by the farmers to access the KIGM which is the only big and well furnished local markets in the area. This could lead to reduction of transportation costs caused by long distance to the market.

The KIGM should adopt appropriate mechanisms to ensure proper monitoring of middlemen behaviours and activities in the market so as to reduce exploitative behaviours to farmers and reduction of middlemen cots.

Information sharing mechanisms and sources used by the KIGM management should be improved so as to ensure farmers have accurate and timely information on price, quantity and quality needed and arrival of buyers. This would lead to reduction of information asymmetry problem hence reduction of information costs incurred by farmers.

4.3 Policy Implications

The findings produced by this study possess practical implication for the central government, local government authorities, maize traders and smallholder farmers as could be used to create conducive environment for the maize value chain. This facilitates the formulation and enactment of various policies regarding reduction of transaction costs in maize crop which could lead to agriculture value chain performance improvement.

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