

# Maize Market Channel Choices by A1 Resettled Farmers in Eastern Region of Zimbabwe: An Institutional View

Never Mafuse<sup>1\*</sup>, Mushunje Abbysinia<sup>2</sup>, Zivenge Emmanuel<sup>1</sup>, Tatsvarel Simbarashe Muast<sup>1</sup>

<sup>1</sup>Department of Agricultural Economics Education and Extension, Bindura University of Science Education, Bindura, Zimbabwe

<sup>2</sup>Department of Agricultural Economics and Extension, University of Fort Hare, Eastern Cape, South Africa

## Research Article

**Received:** 18-Sep-2019, Manuscript No. JAAS-23-2668;

**Editor assigned:** 23-Sep-2019, PreQC No. JAAS-23-2668(PQ);

**Reviewed:** 07-Oct-2019, QC No. JAAS-23-2668; **Revised:** 16-Jun-2023, Manuscript No. JAAS-23-2668(R);

**Published:** 14-Jul-2023, DOI: 10.4172/2347-226X.12.2.001

**\*For Correspondence:**

Never Mafuse, Department of Agricultural Economics Education and Extension, Bindura University of Science Education, Bindura, Zimbabwe

**E-mail:** nmafuse@buse.ac.zw

**Citation:** Mafuse N, et al. Maize Market Channel Choices by A1 Resettled Farmers in Eastern Region of Zimbabwe: An Institutional View. J Agri Allied Sci. 2023;12:001.

**Copyright:** © 2023 Mafuse N, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

## ABSTRACT

Agricultural markets facilitate the mechanisms of food exchange, coordination and allocation of many agricultural goods and services by and between people in Zimbabwean economy. These markets often assume a solution to the problem of poverty among smallholder farmers. This study analysed the influence of institutional factors on marketing channel choices of A1 maize farmers in eastern region of Zimbabwe. Generally, maize farmers' have two choices to sell their product, which are formal and informal market. Eleven independent variables were considered for the study and a binary logistic regression model was used for the analysis. The study found out that, cooperative membership, road condition, contractual farming arrangements, access to financial credit and transport cost to market were significant at 5% level. The study recommends that the government should correct maize market institutional deficiencies so as to improve the welfare of A1 maize farmers.

**Keywords:** Institutional, Market channel, Binary logistic regression, Market

## INTRODUCTION

Smallholder farmers play a critical role in food and nutrition security in Zimbabwe as they account for the bulk of the food that is produced in the country. The most important cereal crop grown by smallholder farmers grown in Zimbabwe, ranking first in the number of producers, in terms of area grown and total cereal production is maize. It is the staple food crop of the nation and is the major activity on smallholder farms, where the greater part of it is retained for home consumption and the surplus is sold. Zimbabwe's farming sector is bimodal, comprising of large-scale and smallholder. The smallholder sector which constitute more than 70% of population, predominantly includes small-scale commercial (semi intensive), communal (extensive) old resettlement scheme and A1 scheme. Out of 70% of the population who lives in the smallholder sector, over 10.7% are A1 farmers and it is the second largest contributor of maize production. These farmers have average of six hectares and were born out of the decongestion of the communal areas. They live in the former white farmers' farms characterised by better soil fertility and they are likely to remain the major source of rural growth and livelihood improvement for some time as it is very important for employment, human welfare, and political stability <sup>[1]</sup>.

There are 1,340,919 farms holding in Zimbabwe and the smallholder farmers contribute 98% of the total farm holding (Agricultural Statistical Bulletin, 2013), with the settled A1 farmers contributing 10.7% of the total farm holding. These farmers account for over 22% of maize production and the government have several projects that are meant to support the A1 resettled farmer so that they increase maize production. They are being supported through maguta programme, reserve bank of Zimbabwe schemes, input presidential schemes and the command agriculture programme. Despite the potential to derive livelihoods from maize production, A1 farmers often face a number of challenges in accessing high value markets. The thorny problems of promoting the growth of A1 farmers in Zimbabwe have been exhaustively examined in many literature inspired by a variety of concerns and ideological predispositions. The emerging consensus from the shifting paradigms of how to promote A1 farmer in Zimbabwe is that it is not easy; that such development will need to overcome a number of structural constraints arising from history and geography. However, such constraints can be solved through a pro-active strategy of institutional development that will increase the effective access of A1 farmers to real opportunities for marketing of their maize <sup>[2]</sup>.

The resettled A1 farmers generally face two different types of markets in Zimbabwe: Informal market; comprising of rural markets or local markets that are often within the proximity of farmers and urban markets. The other market is, local formal market; comprising of rural farmers who, often have no direct access because they are distant from the average markets mainly situated in urban areas and demanding quality specifications and export market; which exists at the regional and international level and are considered to be high value markets which are not usually accessed by A1 farmers.

Markets play a pivotal role in the transformation of agricultural process. Recognition of the potential of markets to unlock economic growth and agricultural development gave rise to market-led rural development paradigm during the 1980's. Markets facilitate the mechanisms of food exchange, coordination and allocation of many agricultural goods and services by and between people in the economy. These markets often assume a solution to the problem of poverty among farmers. This is true as markets are increasingly seen as an adjudicator for poverty reduction process and food security among the smallholder farmers due to market led production initiatives.

This study therefore, focuses on the institutional factors that determine A1 farmers' participation in maize markets. The study aims to analyse in detail the nature of institutional arrangements employed in different maize marketing channels for A1 maize farmers in Zimbabwe. Most of these A1 farmers operate largely in local markets which are

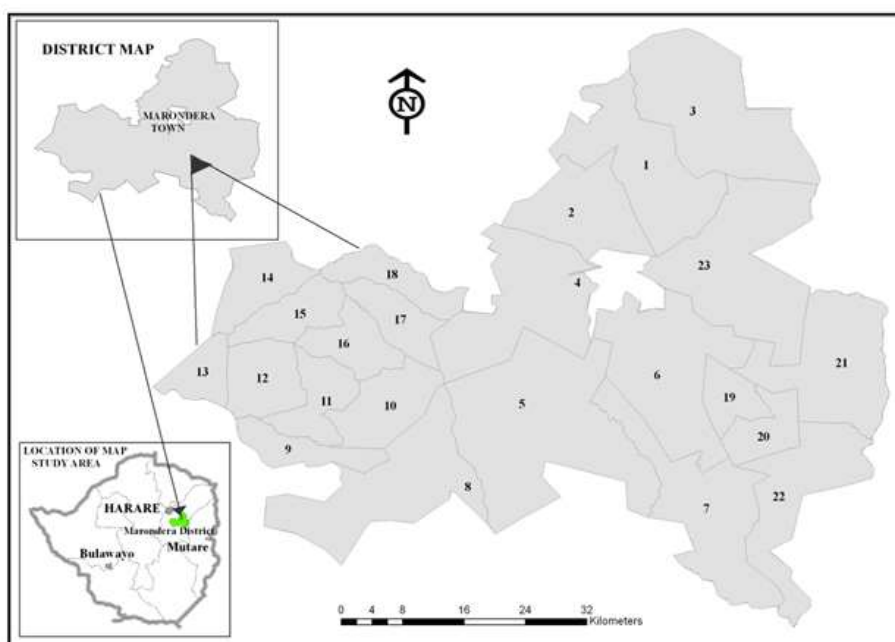
characterized by instability, inequity, inefficiency and offer unviable prices. The A1 farmers lacks connectivity to more lucrative markets either at provincial, national or global levels resulting in weak incentives, investments remain low and so does the level of technology adoption. There is need for reformation of agricultural markets for the resettled A1 farmers if they are to get out of poverty and contribute meaningfully to the national food security [3].

## MATERIALS AND METHODS

### Description of the study area

**Marondera district:** The study was conducted in Marondera district of Mashonaland East Province in Zimbabwe which is one of the nine provinces that constitutes the breadbasket of the country. Marondera district is mainly characterized by farming in the form of urban, peri-urban and rural communities constituting rural resettlements areas. The rural resettlement areas are made up of A1 and A2 and also sizeable numbers of commercial farms which are found in and around Marondera urban areas. The district has more A1 resettled farmers than any other district in the province. People in resettled areas rely mainly on farming and those near farms found livelihoods as farm workers. Marondera district has the total population of around 118547 farmers.

Figure 1. Showing the map of Marondera district.



The district is situated in agricultural region 2 with an average annual rainfall of about 500 mm-1000 mm. High rainfall and very cold temperatures are usually recorded around months of December to February and May to July. The month of October is warmest with an average temperature of 30.1°C at noon. July is coldest with an average temperature of 6.5°C at night. The district has no distinct temperature seasons; the temperature is relatively constant during the year. Temperatures drop sharply at night and increases during the day. These climatic conditions are favourable for maize production and subsequent marketing [4].

Marondera district has some of the most fertile lands in the province and the lands are particularly suited to grow maize and other heavy feeder crops like tobacco, paprika, tomatoes, potatoes and sorghum. The climate is classified as a humid subtropical (dry winter, hot summer), with a subtropical dry forest biozone. The soil in the area is high in lixisols (Ix), soil with clay-enriched lower horizon, own cation exchange capacity and high saturation of bases which are suitable for maize production.

The distinguishing symbols of success in Marondera district are the modest houses with the asbestos roofs, sizeable herds of cattle and its ability to harvest even when there is a drought in the whole country. In times of drought, people from surrounding districts like Hwedza, Seke, Goromonzi, Murehwa and Chikomba would come to seek grain from Marondera district. The farmer manages to ride over most of the droughts by farming three main crops namely maize, beans and finger millet and these grains are supplemented by vegetables, Irish potatoes, sweet potatoes, tobacco and citrus fruits. Their main market for, tomatoes, citrus fruits, and a vegetable is Mbare Musika. Grains are sold at Grain Marketing Board (GMB) and many other grain dealers like Manyame grain millers.

### Sampling frame and sample selection

A multi-stage sampling procedure was adopted. Firstly the study district was purposively selected owing to its largest number of resettled A1 farmers of about seven thousand and twelve framers. This was followed by stratifying the district wards using the villages. Then, the villages with highest number of resettled A1 farmers were purposively selected and finally, simple random sampling was conducted within the villages.

### Determination of sample size

An approach based on precision rate and confidence level method to determine the sample size of A1 finite farmers was used as the populations is known. A Sample of four hundred A1 farmers was taken using a random sampling technique of Slovin's formula sampling technique. This technique allows the researcher to sample the population with some degrees of accuracy and so it gives the idea of how large is the sample size should be to ensure reasonable accuracy of results.

This formula takes into account the confidence levels and margins of error.

Formular

$$n = N / (1 + Ne^2)$$

$$n = 7012 / (1 + 7012 \times 0.05^2)$$

$$n = 400$$

Where;

e=Error tolerance to be allowed in selecting the A1 resettled farmers in Marondera district

N=7012 A1 resettled farmers in Marondera district

E=95 percent which give an error margin of 0.05

A Sample of four hundred A1 farmers out of seven thousand and twelve (7012) were was to be randomly selected and interviewed using structured household questionnaires. However, seven farmers who produced maize for consumption only were not included in the final sample of farmers as they do not market their maize.

Primary data was collected through administration of well designed, comprehensive and pre-tested structured questionnaire. The questionnaire was pre-tested in different sites of the study area and modified accordingly to improve the clarity of questions and remove irrelevant questions through a survey method.

### Model specifications

**Random Utility Model (RUM):** Marketing channels are routes through which agricultural products move from producers to consumers. Kohls and Uhl defined marketing channel as alternative routes of product flows from producers to consumers. The length of the channel varies depending on the quantity of maize to be moved, the form of consumer demand and degree of specialization in production. Farmers, just as they are price-takers, also are channel-takers. They may have an opinion about which actor gives the highest price, which actor provides the best technical assistance but in the end it will be the buyer who decides whether he/she wants to buy produce from a particular farmer.

The resettled farmers' understudies are faced with two choices; formal and informal market participation. It is assumed that these decisions are made on the basis of option which maximizes their utility, subject to institutional factors. As such

the random utility maximizing function was used [5].

**Random Utility Model (RUM)**

**Related literature:** Random Utility Models (RUMs) are well-established methods for describing discrete choice behaviour. RUMs or discrete models describe, explain and predict choices between two or more discrete alternatives. Marketing researchers use discrete choice models to study consumer demand and to predict competitive business responses, enabling choice modellers to solve a range of business problems, such as pricing, product development and demand estimation problems.

**Assumptions**

First assumption is that choice is a discrete event. What it means is that choice is all-or-nothing. They participate in market 1 or 0 markets. Thus choice is not a continuous dependent variable. Second assumption is that the attraction or utility towards the market varies across individuals as a random variable. In any case, second assumption is all about the word random in the label random utility model. The last assumption is that the farmer chooses the channel with the highest utility. This makes farmer an economically rational being.

The RUM or discrete choice models can be derived from utility theory.  $U_{ni}$  is the utility (or net benefit or well-being) that person  $n$  obtains from choosing alternative  $i$ . The behaviour of the person is utility-maximizing: Person  $n$  chooses the alternative that provides the highest utility. The choice of the person is designated by dummy variables,  $y_{ni}$ , for each alternative:

$$y_{ni} = \begin{cases} 1, & \text{if } U_{ni} > U_{nj}, \quad j \neq i, \\ 0, & \text{otherwise} \end{cases} \quad (1)$$

The person’s choice depends on many factors, some of which the researcher observed and some of which the researcher may not. The utility that the person obtains from choosing an alternative is decomposed into a part that depends on variables that the researcher may observe and a part that depends on variables that the researcher may not observe. In a linear form, this decomposition is expressed as;

$$U_{ni} = \beta z_{ni} + \epsilon_{ni} \quad (2)$$

Where,  $Z_{ni}$  is a vector of observed variables relating to alternative  $i$  for person  $n$  that depends on attributes of the alternative,  $X_{ni}$ , interacted perhaps with attributes of the person,  $S_n$ , such that it can be expressed as,

$$z_{ni} = z(x_{ni}, s_n) \quad \text{for some numerical function } z \quad (3)$$

$\beta$  is a corresponding vector of coefficients of the observed variables and captures  $\epsilon_{ni}$  the impact of all unobserved factors that affect the person’s choice. The choice probability is then,

$$P_{ni} = \text{Prob}(y_{ni} = 1) = \text{Prob}(U_{ni} > U_{nj}, j \neq i) \quad (4)$$

$$= \text{Prob}(\beta z_{ni} + \epsilon_{ni} > \beta z_{nj} + \epsilon_{nj}, j \neq i) \quad (5)$$

$$= \text{Prob}(\epsilon_{nj} - \epsilon_{ni} < \beta z_{ni} - \beta z_{nj}, j \neq i) \quad (6)$$

Given  $\beta$ , the choice probability is the probability that the random terms,  $\epsilon_{nj} - \epsilon_{ni}$  (which are random from the researcher’s perspective, since the researcher does not observe them) are below the respective quantities  $\forall j \neq i: \beta z_{ni} - \beta z_{nj}$ . Different choice models arise from different distributions of  $\epsilon_{ni}$  for all  $i$  and different treatments of  $\beta$ . RU models can also be classified according to the number of available alternatives [6].

**Binomial choice models (dichotomous):** 2 available alternatives.

**Multinomial choice models (polychromous):** 3 or more available alternatives. Multinomial choice models can further be classified according to the model specification:

Models, such as standard logit, that assumes no correlation in unobserved factors over alternatives and models that allows correlation in unobserved factors among alternatives. According to there are many types of Rum namely the logistic regression model, the probit model and the discriminant analysis, to mention but a few.

For the purposes of this study, the logit model was employed. The easiness with which the logistic model can handle qualitative dependent variables makes it more preferable over the other techniques. In addition, logit model was used instead of other models because it can handle categorical independent variables easily, whereas in discriminate analysis the use of dummy variable creates problems with the variance/covariance equalities. In addition, other models rely strictly on meeting the assumptions of multivariate normality and equal variance-covariance matrices across groups (assumptions that are not met in many situations). Logit model does not face these strict assumptions and is more robust when these assumptions are not met, making its application appropriate in many situations. Logit models allow for explicit testing of the impact of independent variables on A1 farmer choosing in modern maize markets. Logit has better interpretation than probit. Logistic regression can be interpreted as modelling log odds [7].

**Mathematical representation of logistic model**

The logit model belongs to the qualitative dependent variable methods and is a symmetric distribution which uses the latent variable approach to address the problem of heteroscedasticity since we have two values for the dependent variable. The functional form of the logistic model is given by;

$$\begin{aligned}
 F(z_i) &= \frac{\exp(z_i)}{1 + \exp(z_i)} \\
 &= \frac{1}{1 + \exp(-z_i)}
 \end{aligned}
 \tag{7}$$

Where,  $Z_i$  is the ratio of the probability of success to the probability of failure known as the odds ratio. In the study  $P_i$  is the probability of choosing in modern maize markets. In the case of A1 farmers,  $Z$  may be interpreted as the farmer’s propensity of choosing formal markets, with larger values of  $Z$  corresponding to greater probabilities of choosing informal markets. Logit model coefficients can be used to estimate odds ratios for each of the independent variable in the model. The model also assumes that  $Z$  is linearly related to the predictors, thus we have

$$\log \frac{P_i}{1 - P_i} = Z_i = \beta_0 + \sum_{\forall i} \beta_i X_i
 \tag{8}$$

Where  $X_i$  is the  $i$ th predictor case and  $b_i$  is the  $i$ th coefficient. The model can be used to derive estimates of the odds ratios for each factor to explain how much more the independent variables is likely to choose formal channels than non-cooperative member. If  $Z$  is observable, one would simply fit a linear regression to  $Z$  and be done. However,  $Z$  is unobserved; hence one must relate the predictor to the probability of interest by substituting for  $Z$  as follows;

$$F(z) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_{i1} + \dots + \beta_p X_{ip})}} \tag{9}$$

In this study the model puts forward that A1 farmers from the survey was divided into two categories based on the type of markets which they supply the greater percentage of their maize, either formal or informal markets. It could be modelled as Pr (Y=1) if the farmers supply formal channel markets or Pr (Y=0) if otherwise (Table 1). The underlying assumption is that the farmer chooses one of the two marketing channels in order to maximise his/her net benefits, given a set of constraints. The probability of choosing formal channels is expressed as Pr (Y=1)=F (x<sub>ij</sub>), where x<sub>ij</sub> is a vector of observed exogenous variables representing specificfield and specific farm household characteristics [8].

**Table 1.** Shows dependent (Y) choice of market channel and independent variables.

Explanatory variable	Definition	Measurement	Expected sign (+/-)
Storage costs \$/day	Cost of storing maize	Continuous	-
Access to financial credit	Do have access to financial credit	Binary (1,0)	+
Contractual farming arrangement	Availability of contractual farming agreements	Binary (1,0)	+
Road condition	What is the condition of the road	Continuous	+/-
Access to extension message	Did you receive agricultural marketing training?	Binary (1,0)	+
Cooperative membership	Membership to marketing cooperative	Binary (1,0)	+
Cost of transport to market	US\$/km	Continuous	-
maize market price	US\$/kg	Continuous	+
Yield	Tonnes	Continuous	+
Access to real time market information	Access to maize market information	Binary (1,0)	+
Time to get payment	Days	Binary (1,0)	-

**Explanation of Independent variables**

Explanation of independent variables and their expected relationships to the dependent variable are shown on Table 1 Storage costs variable (STOR), explains the cost of storing maize in storerooms before the actual purchase by buyers at the market per day. Expensive storage facilities reduce the total income for the farmer. Thus, farmers are more likely to participate in informal markets with less expensive storage facilities hence a negative relationship [9].

Access to real time market information variable (MKINFO), reflects accessibility to real time market information. The variable was measured by the farmers’ access to maize market information in time and the ability to comprehend it from different communication networks like the radio, mobile phones, TV, newspapers and telephones. In this case access to market information was set to be dummy , in which farmers with access to market information took the value of one where as those farmers with no access to market information took the value of zero. Accessibility to market information influences farmers to participate in markets positively. This may mean that farmers with access to market information are most likely to participate in formal markets.

Access to Extension messages (EXT) was measured by whether farmer had received training from different extension agencies like the government departments, academic institutions, private institutions, Nongovernmental organisations and lead farmers per month. Access to extension advice knowledge through extension officers influences farmers to participate in formal markets and the variable took dummy values where farmers with access to extension messages took value of one and zero if none [10].

Cooperative Membership (COOP) variable was used to measure the collective action by farmers'. Being a cooperative member or whether they have sold the maize in groups or individually were the key questions and the responses were allocated dummy values. Being a cooperative member or having sold maize as a group was allocated value of one while those farmers who sold maize individually and not in a cooperative took the value of zero. Farmers who work in groups are likely to participate in formal markets as they share costs.

Road Condition Variable (RCOND) explains the presence of good or bad road. Good roads are expected to have a positive influence on formal market participation. Road condition was measured by presence of the road networks which are accessible to farmers. Dummy values were used to define variables, in which good condition took the value of one and zero indicated bad condition [11].

Contractual Farming Arrangements Variable (CONTRFAMENT), is expected to have positive relationship with formal market. This is because the existence of a guaranteed maize market may reduce the costs of searching the markets which may encourage participation of farmers in formal markets. Farmers who were in contract farming took dummy value of one while non-contracted farmers took zero value.

Transport costs can be seen as an opportunity cost of farmer's time and effort in organising transportation, which is measured in \$/km. Cost of transport variable (TRANS), was used to measure the actual cost of transporting maize to markets using different modes of transports. This variable was linked to road condition. Good roads reduce transportation costs while bad roads increase transportation costs especially when transport is hired.

Market price variable (MRKTP) is expected to have positive relationship with formal markets because they are more lucrative markets hence they pay more as compared to informal markets. The variable was measured in (\$/tonne) of maize. Market price plays an important role in market channel selection because it greatly affects the revenue generated by the farmer and provides an incentive for farmers to participate in that market channel.

Yield is the total quantity in tonnes of maize produced per hectare. This variable is expected to have a positive relationship with the formal maize markets. This is because formal markets buy in large quantities [12].

Time to Get Payment (TMEGP) is a type of negotiation which is measured in days that influence whether to market informal or in formal market. In this case time to get payment measures whether farmers have to wait for a payment after the sale of maize.

Payment made after one week was considered as delayed and time to get payment was set to be dummy, in which farmers who got paid within one week took the value of one where as those farmers who got paid after one week took the value of zero. Time to get payment is likely to have a negative relationship with formal markets because they have the power to establish price and payment time [13].

## RESULTS AND DISCUSSION

### Cooperative membership

Marketing as a cooperative is significant (003\*) at 5% level with positive influence on selecting formal market channel by A1 farmers. This means that, marketing maize through cooperative group increases the probability of A1 farmers to select formal maize market .

The results are consistent with who reported that, being in a group, farmers are effective in pooling external inputs, lobbying for favorable marketing policies and dissemination of market information. Farmers have also access to external organisation which can facilitates the creation of links to output formal markets (Table 2).



**Table 2.** Binary logistic regression result for maize market channel.

	B	S.E.	Wald	Df	Sig.	Exp(B)
Cooperative membership	1.678	0.572	8.606	1	0.003*	5.353
Time of payment (days)	-0.066	0.367	0.033	1	0.856	0.936
Road condition	-1.252	0.224	31.257	1	0.000*	0.286
Access to extension messages	-0.14	0.924	0.023	1	0.88	0.87
Accessibility to market information	-0.386	0.886	0.189	1	0.663	0.68
Contractual farming arrangement	2.69	0.415	41.954	1	0.000*	14.734
Price of maize( \$/T)	0.001	0.001	0.759	1	0.384	1.001
Total yield (t)	0.028	0.045	0.393	1	0.531	1.029
Access to financial credit	0.447	0.214	4.348	1	0.037*	1.564
Storage costs	0.006	0.02	0.098	1	0.754	1.006
Transport costs to market	-0.014	0.004	9.894	1	0.002*	0.987
Constant	3.939	1.555	6.416	1	0.011	51.373

### Contractual farming agreements

A positive and significant (0.00) relationship was found between maize formal market and the availability of contractual farming arrangements. The relationship implies that A1 farmers increase in maize formal market selection with the availability of contractual farming arrangements. The value odds ratio (14.73) strongly supports the probability of the variable influence on the formal maize market choice.

The findings are in line with who reported that contractual farming agreements significantly influence the selection of formal markets. Contract farming link farmers to markets; give them access to credit, technologies and inputs, and to stimulate agricultural production farming.

### Access to financial credit

Access to financial credit has a positive relationship with formal market selection. It has a significant value of (0.037\*) at 5% interval. This implied that, access to financial credit by A1 farmers increases the chances of the farmers selecting formal maize markets by 40%. Theoretical studies have also suggested that availing finances to smallholder farmers would create major marketing opportunities in formal markets which are lucrative. However, despite the rapid development of financial services in Zimbabwe, majority of the A1 farmers remain without access to financial credit to finance marketing activities due to lack of collateral and high cost of borrowing.

One major sticking point on collateral is lack of property rights on the land they own. The land tenure system is not accepted by banks and other financial organisations and yet access to financial services, credit products, and other financial innovations could expand more A1 farmers rewarding marketing opportunities [14].

### Road condition

A negative and significant (0.000\*) relationship at 5% interval was found between formal maize market channel and the road condition. As expected, the availability of good roads should have an influence on formal markets as they buy in bulk. However, the presence of negative coefficient means that improving the road condition will increase the selection of informal maize markets.

One possible explanation could be that informal marketing activities like selling to nearby boarding schools, clinics and other maize buyers tend to increase as the road conditions are improved because good roads facilitates better of trucks in rural areas. The results are in line with those of who found out that, the availability of good road is likely

to encourage households to market their produce through informal channels.

### Transport costs to market

There is a negative (0.014) and significant (0.002\*) relationship between distance travelled and the money paid for every kilometer. This means that an increase in one kilometer travelled led to the reduction of transport cost by 0.01 (1%). The possible explanation for this reduction in transport cost could be that of incessive rains of 2016/2017 season that dissected the narrow and bad feeder roads that links the A1 farmers and the mains roads. Cost of transporting maize along the feeder roads is expensive as the roads are bad .However; there was a marginal reduction of transport cost on the main roads for every kilometer travelled because the roads are good. The results are contrary to who reported that transport cost increases with an increase in kilometers travelled. In this case formal market channel increases the farmer's gross margin <sup>[15]</sup>.

## CONCLUSION

The study identified institutional factors influencing maize market selection by A1 farmers who are part of the smallholder farmers in Marondera district of Mashonaland East Province in Zimbabwe. Findings from the study supports large of body literature which points out that, institutional arrangement and environment influences the smallholder farmers' participation in formal markets. The following institutional factors were statistically significant at 5% level: Cooperative membership, road condition, contractual farming arrangements and access to financial credit and transport cost to market respectively. Creating, improving and correcting each one of the significant variables in the model would probably influence the chances of the A1 farmers to participate in formal maize markets. This can be done through a consensus effort of all stakeholders in maize sector: Farmers, government, private players and nongovernmental organisation.

Characteristically, A1 farmers have small pieces of land about six hectares, poor resource endowment and weak social capital as they resettled on the farms left by white farmers from different areas and they generally produce small amount of maize for sale. This means that these farmers may not be able to compete with other large farmers on formal maize markets unless they work in a group or in cooperative. Working as cooperative would enable them to lobby for better price, marketing facilities and to be remembered whenever there are special programmes that suit them. Formation of cooperatives in the A1 farmers would also enhance the social capital and farmers can be now linked to other formal markets chain actors.

The A1 farmers' road networks require a drastic action as they roads are badly damaged by the rains. The roads are in sorry state since there is no rehabilitation taking place since the departure of the white farmers. Only major roads which connect with Marondera town and other districts are maintained while the feeder roads are forgotten. It is therefore imperative for the government or councils through their departments to resuscitate or improve the road conditions. In Zimbabwe, there has been little contract farming initiatives for maize production especially on smallholder farmers. Contract farming has been regarded as the only solution to food insecurity in Zimbabwe as this provides inputs, overcomes the barrier of entry to lucrative marketing channel, reduces marketing costs thereby increasing profits and reduces marketing costs. The government has been promoting contract farming through maguta operation and command agriculture programmes but can be extended to other stakeholders like the NGO and private companies.

The ability of A1 farmers to invest for the long term and make calculated decisions for risky and time-patterned income flows is determined by the availability of financial services. In Zimbabwe, there has been a boom in the

number of financial organisations. However; there is limited access to financial credit by A1 farmers which is needed to actively participate in the formal markets so that they can improve their livelihoods. The stringent and high cost of borrowing money from financial organisations makes it impossible for the A1 farmers to borrow money. There is need therefore to expedite on the A1 land tenure systems so that it can be bankable. This is because this is the only most important capital asset that can be used by A1 farmer to get financial credit. The government of Zimbabwe can also support the A1 farmers through technical innovations. These may be in the form of investments in public facilities such as improved roads, so that transport costs to markets can be reduced.

## REFERENCES

1. Winnifrith SJ. The Ministry of agriculture, fisheries and food. *Min Agr Fisher Food*. 1962;12:12-15.
2. Chiweta C, et al. Maize market reforms in Zimbabwe. A case study of the implications on maize production viability and household food security of smallholder farmers in Mazowe district, Mashonaland Central Province, Zimbabwe. *Afr J Agr Res*. 2015;7:6254-6264.
3. Bharucha Z, et al. The roles and values of wild foods in agricultural systems. *Philos Trans R Soc Lond B Biol Sci*. 365:2913-2926.
4. Jari B, et al. An analysis of institutional and technical factors influencing agricultural marketing amongst Smallholder farmers in the kat river valley, Eastern cape province, South Africa. *Afr J Agri Res*. 2009;4:1129-1137.
5. Kang'ethe SM, et al. Exploring challenges and opportunities embedded in small-scale farming in Zimbabwe. *J Human Ecol*. 2014;46:177-185.
6. Kirsten J, et al. Linking agribusiness and small-scale farmers in developing countries: is there a new role for contract farming? *Dev South Afr*. 2002;19:503-529.
7. Hingley M, et al. Marketing of agricultural products: Case findings. *Brit Food J*. 2002;104:806-827.
8. Mutami C. Smallholder agriculture production in Zimbabwe: A survey. *Consilience*. 2015;14:140-157.
9. Mutura JK, et al. Analysis of determinants of vertical and horizontal integration among smallholder dairy farmers in lower Central Kenya. *Int J Agri Food Res*. 2016;5:13.
10. Zivenge E, et al. Analysis of factors influencing market channel access by communal horticulture farmers in Chinamora district, Zimbabwe. *J Develop Agri Eco*. 2012;4:147-150.
11. Villas-Boas JM, et al. Endogeneity in brand choice models. *Manag Sci*. 1999;45:1324-1338.
12. Li Y, et al. A Bayesian semiparametric approach for endogeneity and heterogeneity in choice models. *Manag Sci*. 2014;60:1161-1179.
13. Petrin A, et al. A control function approach to endogeneity in consumer choice models. *J Mark Res*. 2010;47:3-13.
14. Xu Y, et al. The interplay between online reviews and physician demand: An empirical investigation. *Manag Sci*. 2021;67:7344-7361.
15. Malasane PR. Study of Interactions of tryptophan through acoustic and thermodynamic properties. *Res J Chem Sci*. 2013;3:73-77.