DOI 10.15520/sslej.v6i11.2873 http://sslej.in/index.php/sslej Research Article

ISSN: 2456-2408 Social Science learning Education Journal

# Effect of Maize Stock Procurement Practices on Unpredictable Price of Maize Flour in Rwanda: A Case of Minimex Limited

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***Abstract***: *- Among the most common food crops produced worldwide, maize can be considered as among the global leading cereals in terms of production and consumption. It is produced across variety of regions and climatic conditions. However, majority of production worldwide, especially in the developing countries is carried out by smallholder farmers who encounter challenges in accessing formal markets. This also provide challenges for maize millers in accessing quality and enough quantity from the smallholders farmers spread across various regions. This research aimed at investigating the effect of maize stock procurement practices on the unpredictable prices of maize flour in Rwanda, taking a case study of Minimex Ltd. It was guided by three specific objectives, namely, to investigate the effect of procurement assessment on unpredictable price of maize flour in MINIMEX Ltd; to investigate the relationship between procurement strategies and unpredictable price of maize flour in Minimex Ltd. and to investigate the effect of procurement forecasting on the unpredictable price of maize flour in Minimex Ltd. Descriptive research design and analytical design were used where primary data were collected using questionnaire and interview guide. The study population was 83 respondents who also made up the sample size. Data collected were analyzed using SPSS version 21 which facilitated the presentation using tables and graphs. Further, Pearson's coefficient correlation and regression analysis were carried out to find the relationship among the study variables. The research findings showed that procurement assessment is important to determine the amount of materials to procure from the suppliers, 93.1% of the respondents agreed and 6.9% strongly agreed. 75% of the respondents agreed that Minimex uses different strategies in securing contracts with suppliers with a mean score obtained was 3.75. In addition, Minimex always forecast the future procurement needs in order to plan for its operation. 70.8% of the respondents agreed with the statement on whether the forecasting of procurement needs is conducted based on the demand of maize flour in the market. The regression analysis conducted to determine the relationship between the study variables gave an R-squared of 0.79 clearly indicating that 79% of the pricing of the maize flour is influenced by procurement assessment, procurements strategies and the procurement forecasting conducted in Minimex Ltd. All the three variables, namely, procurement assessment, procurement strategies and procurement forecasting were found to have positive and statistically significance influence to maize flour pricing at 5% level of significance. The researcher was able to draw a conclusion based on these findings that there is need to emphasize the procurement of maize stock as a way of stabilizing maize flour prices in the market. Different recommendations were provided to the policy makers, regulators, Minimex, suppliers, smallholder farmers and other key parties in the maize market. For policy makers, it was recommended that they should regulatory bodies should see to it that standardized agricultural inputs are available in the market for the maize farmers.*

## Introduction

### Background to the Study

In most developing world, the main food producers in the food chain supply are smallholder farmers. Their capacity is however constrained by various challenges they face. Some of these challenges Include weather and climatic changes, lack of adequate supply of farm inputs, costs of labor, and constraints in the market, poor road and access factors, among others (United Nations Development Programme, [UNDP] 2012). According to Cohen

and Smale (2014), among all these challenges, the inaccessibility to market and other market factors form part of the main challenges small-scale farmers face. However, this market related problems are as a result of combined factors. For instance, poor road infrastructure and lack of market information on price and demand can constraint the farmers from accessing markets at right time. Due to these challenges, policy makers and government bodies should be involved to ensure that the farmers output reach the market at the right time and right price. At the same time, their intervention can help reduce the possibilities of farmers' exploitation by middlemen and brokers.

Among the most common food crops produced worldwide, maize can be considered as among the global leading cereals in terms of production, with 1,016 million metric tonnes (MMT) produced on 184 million hectares (M ha) globally (FAOSTAT, 2013). Maize is produced globally across temperate and tropical zones and spanning all continents. The maize agri-food systems focuses on (sub-)tropical maize in the low- and middle-income countries that provide 64% of total maize production and where maize plays a key role in the food security and livelihoods of millions of poor farmers. Maize is one of the three leading global cereals that feed the world (Shiferaw et al., 2011). Maize, together with rice and wheat, dominate human diets (Ignaciuk & Mason, 2014) and provide at least 30% of the food calories of more than 4.5 billion people in 94 developing countries.

Many factors have contributed to the popularity in production and use of maize. Some include growing population rate, multiple uses of maize that makes it world's most multipurpose crop, as animal feed, rising income levels. Global cereal production is expected to increase by almost 370 MT through the next decade, reflecting a growth of 15% by 2023 (OECD-FAO, 2014). By 2050, the global demand for maize could increase by 50% (Ignaciuk & Mason, 2014). Timsina et al. (2011) suggested that, by end of 2020, maize demand alone in Asia might increase by as much as 87%. Developing regions will account for more than 75% of additional agricultural output over the next decade (OECD-FAO, 2014). Maize supplies 15% of global human protein requirements and 35% of protein requirements in Eastern and Southern Africa within 76% of carbohydrate; maize is consumed as grains and also as flour (World Bank, 2007).

In Rwanda, Ngaboyisonga (2010) stated that maize ranks second to sorghum among cereals and third to all crops, covering 10% of the total cultivated land after beans (25%) and banana (22%). It is produced on approximately 140,000 ha with a grain yield of 1.2 t/ha. It is currently grown in all Rwandan ecologies including lowlands with low rainfall (900-1450 m), mid-altitudes (1450-1700m) and highlands with altitude of less than 1700m (ISAR, 2010).

Compared with retail prices in other main urban markets in the region, particularly Ugandan and Tanzanian, Rwandan maize is expensive and not competitive. Even factoring in transport costs from Mwanza to Kigali, Tanzanian produce is still competitive, as are imports from Kabale (South-East Uganda). It is not clear however the reasons for the price differentials, but may be due to incomplete data, the high transaction costs due to fragmentation of supply and aggregation, high costs related to drying due to the more humid Rwandan climate, and the limited storage capacity compared with the neighboring larger countries. This research investigated the relationship of maize stock procurement practices on unpredictable price of maize flour in Rwanda, taking a case of Minimex Ltd.

**Statement of the Problem**

Much of food that is consumed in Rwanda is either imported or home grown. However, there exists a very wide gap between food imported to Rwanda and food exported from Rwanda. According to Ngaboyisonga (2010), the food imported is much higher than the food exported with the gap continuing to widen further as a result of increase in population. This is despite the availability of arable land in Rwanda and relatively a large labor force. For instance, Rwanda government spends 5.5 billion Rwf per year on imported maize, wheat and soybeans seeds. A research by Duke University Center on

Globalization, governance and competitiveness found out that the production of maize significantly increased by 650% between the years 2004 and 2013. The government programme promoting the use of hybrid seed is aimed at easing the production of maize and consequently the procurement of seeds. In fact, one of its objectives is to see that Rwanda can be able to produce its own seeds and reduce the burden of input procurement. According to WFP (2015) the SHF face difficulties in accessing formal markets and would therefore prefer to sell their produce at lower prices in the nearby markets that promise ready income for them to meet their other needs. Coupled with the problems of infrastructure, accessing the markets become a big handle to overcome. Consequently, the procurement of maize stock become a challenging factor for maize millers given that the targeted suppliers are smallholder farmers. Another challenge that tend to increase the costs of production in Minimex is the cost associated with quality of the procured maize stock. Although Rwanda maize is considered to be clean, it contain grains of differing colors which tend to increase the costs of sorting by about 25%. This could be attributed to procurement from various smallholder farmers who may be using different seeds and different farming techniques. The lack of large-scale production of maize within Rwanda that can satisfy the needs of Minimex therefore does not solve this challenge. The main objective of this research was to investigate the effect of maize stock procurement practices on unpredictable price of maize flour in Rwanda taking the case of Minimex Ltd.

**Specific Objectives**

The specific objectives that guided this research were:

To investigate the effect of procurement assessment on unpredictable price of maize flour in Minimex Ltd.

To investigate the relationship between procurement strategies and unpredictable price of maize flour in Minimex Ltd.

To investigate the effect of procurement forecasting on the unpredictable price of maize flour in Minimex Ltd.

**Literature Review**

**Theoretical Review**

**Understanding Maize Stock Procurement practices**

Procurement refers to the process by which organizations obtain the goods or services they need from external source for their daily operations. It includes all the activities involved in the entire procurement process of acquiring goods from the moment the need is identified to the moment the goods are delivered (Erridge, Fee & McIlroy, 2001). According to Dominick, Lunney and Lunney (2012) procurement is a complex process involving in most cases involving more than two parties and series of negotiations among the parties. It also includes contract signing to rubber stamp long-term relationships between the parties involved. Since organization would like to get better prices out of their procurement deals, they usually involve bulk purchase of good and/or services. Consequently, procurement and purchase are quite distinct terms. In addition, procurement process involves both direct function and indirect function of the process. Direct procurement function is the purchase of high volume goods and/or services, which directly facilitate the creation of end product that identifies the main business area of that company.

On the other hand, indirect procurement function involves purchasing support materials and services that are necessary as support for the completion of the end product (Erridge, et al., 2001). For instance, procurement of maize stock is a direct procurement function for Minimex Ltd Rwanda while the procurement of security services is an indirect procurement function. This clearly show that indirect function provides supportive services or materials for the main defining function for the company. Nevertheless, the indirect procurement function cannot be ignored because they are also very important for the smooth operation and achievement of the desired end product. It is noted by Ochanma

(2015) that direct procurement function accounts for fewer procurement transactions and trading around 20% to 40% for manufacturing companies but account for significant amount of expenditure up to 60% of the firm procurement expenditure.

**Procurement Assessment**

According Dominick et al. (2012), the practice of procurement has been there since long time ago with the same of objective of acquiring inputs at the best prices and from the best supplier possible. However, due to the changes of the business environment coupled with technological changes, the way procurement was done years earlier has changed and even become more complex. With many companies nowadays been driven to produce according to the customers' needs and demand, procurement is of lately influenced not basically by the company needs to produce but by the company's need to meet a market demand or gap. This consequently has led to many organizations seeking to outperform their competitors through initiating sound procurement procedure and strategies.

According to Ochonma (2015), the preparatory stage of any procurement procedure is crucial in determining the performance and the end result of procurement. Before starting a tendering procedure, an organization should set aside sufficient time for determining the expected end results, the actual needs, the subject of the contract and analysis of the market. It is in the early stages of the procurement process where the basics for an efficient inclusion of accessibility considerations are done. It also lay the foundation for the procurement of goods and/or services that are needed for the day-to-day operation. With these in place, the management is able to determine the viability of the procurement needs and whether the identified suppliers are able to meet these needs (Kelly & Swensson, 2017).

**Procurement Needs Forecasting**

This refers to forecasting the future procurements needs, which should be guided by the current needs, the past experiences and market needs. To forecast effectively the future procurement needs, market information must be availed from all the stakeholders in the maize sector. Consequently, there should be adequate support of information systems in the maize market. Regular data on maize relating to the supply, demand, import prices and tariffs should be collected to ensure completeness of the data. This would in turn help the organization make better-informed decisions that can help in future procurement planning. According to a survey jointly conducted in 2002 by International Institute of Agriculture (IITA-FOODNET), Institute of Science Agronomic of Rwanda (ISAR) and PEARL-Project, the need for forecasting procurement needs is driven by the increasing changes in the demand market for maize.

Due to these changes, there exists a gap between the maize supplied locally and the maize demanded within Rwanda. As such, forecasting techniques used by the maize miller should be able to factor in this supply gap and put in measures that can be able to curb any possible shortages in the future (Prasanna, 2014). As an observation by Kuiper, Lutz and Van (2013), whenever there is shortage of the supply of maize in the market, there is a tendency of increased prices for maize flour. This is in tandem to the law of demand and supply.

The forecasting for procurements needs also should incorporate the forecast on the value chain modification. In this, maize millers need to check the current value- chain addition process and determine whether modifications are needed or not. This can be done through constantly collecting market information to determine the market demand changes. In line with this, the maize millers can observe changes in customer taste and determine whether product diversification is needed. For instant, exploring additional value-added maize products like grits, bran, corn oil, ethanol, mixed flour, enriched maize blends, etc. can help to determine whether there is need to modify the value chain (Cohen & Smale (2014).

**Procurement and Pricing of Maize Flour**

Best practiced procurement can greatly influence the pricing of the maize flour and other end products of maize stock. As noted by Kaminski, et al. (2013), there exist price gaps between different qualities of

maize stock. For instant, the price of white and yellow maize differ. Consequently, the procurement costs associated with these varieties of maize will have an impact on the final products. One practice that help in stabilizing prices for maize flour is establishing good and efficient post-harvest handling and storage techniques. These enhances the quality of the grain, their maintenance, their preservation and in the long-run help reduce wastages and losses (Harvey, 2016).

**Conceptual Framework**

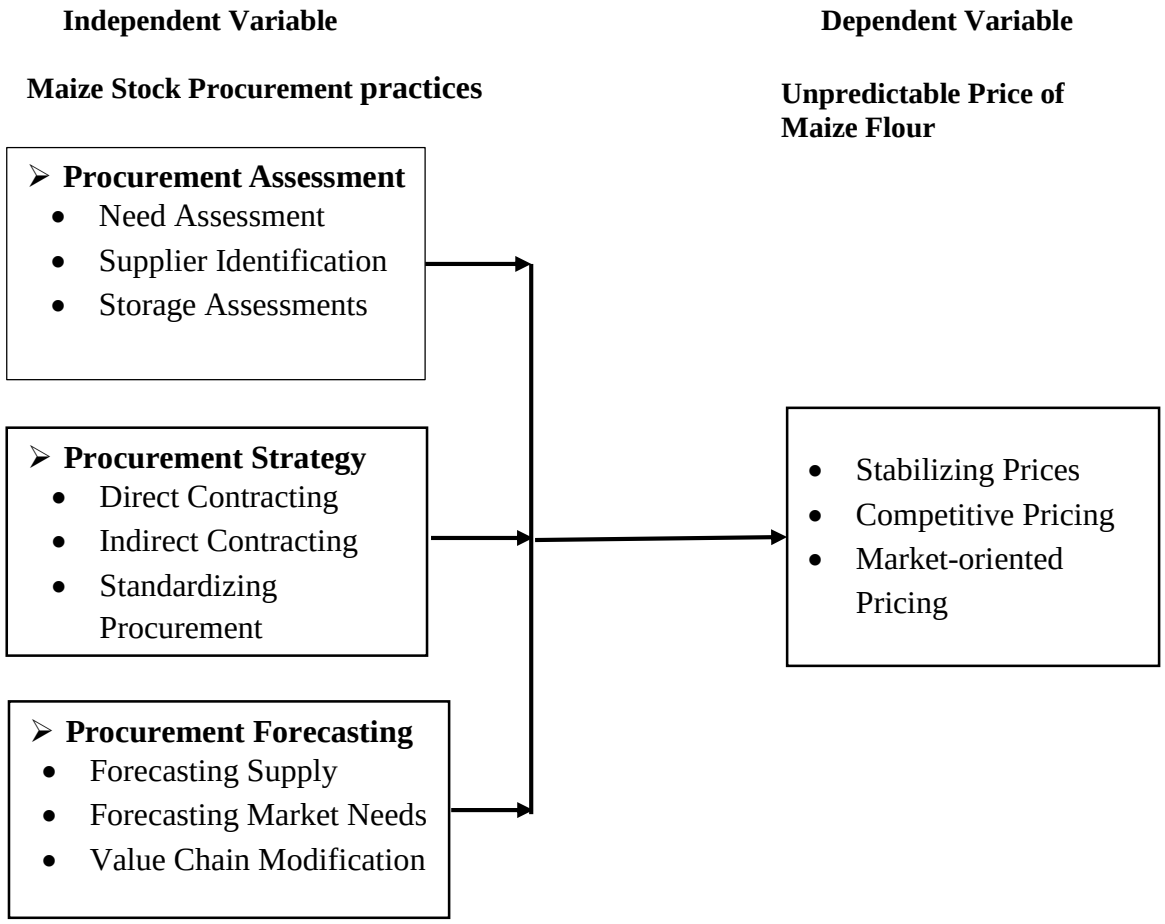


Figure 2.2: Conceptual Framework

Source: Researcher, 2020

Figure 2.2 show the conceptual framework developed for this research to guide the literature discussion and the focus for data collection. This was formulated to be in line with the research objectives and shows the independent variable and the dependent variable. On one side of the figure, the independent variable was the maize stock procurement practices. The researcher sought to investigate the maize stock procurement as a practice or strategy among different players in the maize market. Consequently, the indicators for this variable included procurement assessment, procurement strategies and procurement forecasting. Procurement assessment was measured by need assessment, supplier identification and storage assessment that are used to evaluate the maize procurement needs and Minimex capacity for storage. The idea here was to find out the effect of procurement assessment in identification of market needs, suppliers identification and the storage capacity with an aim to show whether the assessment has an effect on the pricing of the maize. Procurement strategies investigated included direct contracting, indirect contracting and standardizing procurement while procurement forecasting involves predicting the future procurement needs. This was measured using

forecasting supply and market needs as well as needs for value chain modifications.

## Research Methodology

### Research Design

Research design refers to the way the study is designed, that is the method used to carry out the research (Mugenda and Mugenda, 2003). Research design provides an overall plan and structure of investigation that will be followed in conducting the whole of the research. Research design is a set of advance decisions that make up the master plan specifying the methods and procedures for collecting and analysing the needed information (Dyslex, 2011). Descriptive research design was used in this research that was quantitative in nature. The use of descriptive design enabled the researcher to provide a clear description of the study variables as investigated in the research. Analytical research design was also used where correlation and regression analysis were used to capture the effect of maize stock procurement practices to the unpredictable maize flour prices in Rwanda.

### Study Population

According to Kothari (2003), population refers to the set of all elements or items in a research. He further argues that a researcher can decide to use a population or a portion of the population. However, he contends that where all elements are indeterminable or not accessible, a researcher is recommended to use a sample instead. The population forms elements of interest in the research. In this research on the procurement of maize stock and its effect on price of maize flour, the interest was the employees working in Minimex Ltd. Therefore the population was made of the employees in Minimex as shown in Table 3.1.

**Table 3.1: Study population**

| Department | Number of employees |
|---|---|
| Production | 38 |
| Administration | 22 |
| Marketing | 16 |
| Finance | 7 |
| **Total** | **83** |

Source: HR Department, Minimex Ltd, 2020

### Sampling Design

### Sample Size

A sample is a set of individuals selected from a population and usually intended to present the population in a research study (Garson, 2012). According to Mugenda and Mugenda (2003), it is only justifiable to select a sample if the population is more than 100. In this case. The population was considered small and therefore all the employees were considered as the sample. This meant that all the departments in Minimex were involved in providing the needed data. Moreover, the use of the various departments within the institution enabled the researcher to obtained sufficient and reliable information flowing from the various people contacted and the departments.

## Summary, Conclusion and Recommendations

### Summary

The background information revealed that majority of the respondents were male at 66.67% (see Figure 4.1); 40.3% were aged between 31-35 years (see Table 4.1); 62.50% of the respondents had up to Certificate level (see Figure 4.2). It also showed that 52.38% of the respondents had spent between 5-10 years with Minimex Ltd. (see Figure 4.3) while 33.3% of the respondents were site surveyors (see Table 4.2).

### Summary on Objective One

The findings on objective one indicated that 72.2% of the respondents' indicated that they are involved in procurement in Minimex Ltd. while 65.3% of the respondents said they were aware of the procurement process (see Table 4.3). On whether procurement assessment is important to determine the amount of materials to procure from the suppliers, 93.1% of the respondents agreed and 6.9% strongly agreed (see Table 4.4). On whether suppliers are assessed on the basis of the quality of maize stock they provide with

73.6% of the respondents agreeing and 26.7% strongly agreeing (see Table 4.5). 93.1% were in agreement that the storage capacity in Minimex is sufficient to stock enough maize stock needed for processing (see Table 4.6).

**Summary on Objective Two**

The objective two was concerned with procurement strategies that are applicable in Minimex. The findings revealed that 75% of the respondents agreed that Minimex uses different strategies in securing contracts with suppliers with a mean score obtained was 3.75. 70.8% of the respondents disagreed that Minimex Ltd. directly contract from smallholder farmers (see Table 4.7). However, all the respondents were in agreement that the company contract local retailers and cooperative. In addition, 94.4% of the respondents were in agreement that the company engages secondary suppliers because of the quantity and quality they provide (see Table 4.8). Related to second objective, the research findings on whether the company uses standardized procurement process revealed that 90.3% of the respondents agreed. In addition, 87.5% of the respondents were in agreement on whether all payments for procured maize stock are managed separately and in a standard form (see Table 4.9).

**Summary on Objective Three**

Based on objective three, the research findings indicated that Minimex always forecast the future procurement needs in order to plan for its operation. 70.8% of the respondents agreed with the statement on whether the forecasting of procurement needs is conducted based on the demand of maize flour in the market (see Table 4.10). 94.4% of the respondents were in agreement that some of Minimex supplies forecast are met through importing maize stock (see Table 4.11).

Further, regression analysis conducted to determine the relationship between the study variables gave an R-squared of 0.79 clearly indicating that 79% of the pricing of the maize flour is influenced by procurement assessment, procurements strategies and the procurement forecasting conducted in Minimex Ltd. (see Table 4.15). All the three variables, namely, procurement assessment, procurement strategies and procurement forecasting were found to have positive and statistically significance influence to maize flour pricing at 5% level of significance (see Table 4.16).

**Conclusion**

The research was undertaken to investigate the effect of maize stock procurement practices on unpredictable price of maize flour in Rwanda, a case of Minimex Ltd. As per the research, the specific objectives covered three main indicators, namely, procurement assessment, procurement strategies and procurement forecasting. The findings revealed that these indicator variables are statistically significant and positively influence the maize flour prices. All the three variables were found to have positive and statistically significance influence to maize flour pricing at 5% level of significance. As a conclusion therefore, the use of procurement assessment, procurement strategies and procurement forecasting can positively help Minimex in stabilizing the price of flour which for the better part is unpredictable. These approaches to procurement enable organizations like Minimex to efficiently identify suppliers and quality materials at the most economical way. In addition, the acquired materials need efficient handling. Therefore, the researcher was able to draw a conclusion based on these findings that there is need to emphasize the procurement of maize stock as a way of stabilizing maize flour prices in the market. Moreover concerted efforts should be focused on wining procurement strategies and procedures that would ensure proper sourcing, proper storage and efficient distribution of maize stock for quality and stable pricing of maize flour.

**Recommendation**

The researcher was able to make various recommendations which were based from the research findings. These recommendations go to the policy makers, regulators, Minimex, suppliers, smallholder farmers and other key parties in the maize market. First, the researcher recommends that maize millers should be vibrant in the maize stock market and be able to offer support to smallholder farmers. The findings in the course of this research revealed that there are very many SHF in the maize market who supply maize directly to the market due to their immediate need for cash. However, big maize millers like Minimex prefer contracting supplies of

maize stock through cooperative and middle men agents. This procurement strategy tends to inflate the prices of maize stock and hence the maize flour pricing. The researcher therefore recommends that both the policy makers and regulators should support the local farmers in order to protect them from middlemen as well as regulate the supply in the maize market. Efforts in stabilizing maize flour prices should be in line with the domestic maize market. It was revealed in the research that Minimex procurement is mostly from large suppliers as well as from importation. Despite these, there are many maize farmers whose potential is not yet tapped to provide steady and sufficient supply of maize stock. It is the work of the regulators as well as the big maize millers to provide support for these SHF.

In addition, the researcher recommends that regulatory bodies should see to it that standardized agricultural inputs are available in the market for the maize farmers. This would ensure that there is quality supply of maize coming from large scale farmers as well as from the smallholder farmers. Similarly, it is the duty of the SHF to ensure that they practice modern agriculture to have their maize compete in the maize market. Cooperative agents need also to play a part in this endeavor and ensure that they carry out their mandate as supportive agents for the small scale farmers. Moreover, the maize market in Rwanda is comparatively new and small in the East Africa region. This market is a promising market as many Rwandese continuously embrace the maize flour as a alternative food stuff in their meals. Hence, the player in the market including Minimex have a bigger potential market in future. In order to increase this market, and to enjoy the possible gains, maize millers and cooperatives should work to sensitize the growing market on the benefits of maize crop. In addition, most of the Rwanda maize is consumed while still green, with very few reaching to maize flour processing. The researcher highly recommends that storage facilities to be put in place at district or sectoral places to ensure that dried maize is of high quality for milling.

**Study Limitation**

This research, just like any other research was limited in scope, time and content. The current research only concentrated on the procurement of maize stock as an influencing factor to maize flour pricing. However, there are other factors of interest that affect maize flour pricing. Hence, the reading and interpretation of the findings in this research should be done with this in mind. Moreover, the researcher covered a limited timeline of three years. Yet the maize market can be traced way back several years. Since the main concern was not to find a trend in the maize market, the timeframe was for this research was deemed sufficient. Nevertheless, the maize flour price fluctuations can be studied over a larger time scope in future research.

In addition, the research was more on concentrated on one particular maize miller, namely, Minimex ltd. However, different maize millers exist in the Rwandan maize market whose research would give similar or different result. However, this does not disqualify the quality of the findings in this research. It only points to that more research could be carried to cover wider maize market. Hence, the reader should interpret the results in this research in light of this limitation. Just like any other research, there must be a starting point or an entry point to a research. This research is limited in that entry point. It studied the maize flour prices from the maize miller's point of view, yet there can be other studies focusing on the farmers' supply side or on the consumers' demand side.

**Suggestions for Further Study**

Further research can be conducted based on the following areas of study

1. The effect of small scale farming on the pricing of maize flour in Rwanda.
2. The effect of maize flour variety on the pricing strategies in Rwanda market.
3. The determining factors on the maize stock farming and supply in Rwanda.

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