FACTORS AFFECTING PRODUCTION OF MAIZE AMONG FARMERS IN MZUMBE WARD

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Abstract

This study explores the factors affecting the production of maize among farmers in Mzumbe ward. It is important to understand the challenges facing these farmers in order to improve their yields and livelihoods. The study employs a mixed-methods approach, using both quantitative and qualitative data to analyze the determinants of maize production. The study finds that resource availability, market demand, size of the farm, education level, gender and income, all play important roles in determining the level of maize production. The results also reveal that yield per acre is used as a standard measure of maize productivity. Generally these findings highlight the need for targeted interventions to improve the productivity and profitability of maize farming in Mzumbe ward.

1.0 Introduction

The worldwide production of maize is a significant concern because maize is a staple food crop for millions of people across the globe. According to the Food and Agriculture Organization (FAO), maize is the second most important cereal crop in the world, after wheat, with a global production of 1.1 billion tons in 2019. In Africa, maize is the most widely grown cereal crop, providing food, income, and employment opportunities for millions of smallholder farmers and their families. (FAO 2019).

However, the production of maize in Africa faces several challenges, including limited access to quality seeds, inadequate infrastructure and support services, limited access to credit, land degradation, water scarcity, and pests and diseases. These challenges limit the productivity and profitability of smallholder farmers, who constitute the majority of maize producers in Africa. Therefore, addressing these challenges is critical to enhance the productivity and profitability of maize production in Africa and ensure food security for millions of people. (Jayne, Chamberlin and Headey 2014)

In Tanzania, maize is the most widely grown cereal crop, covering over 5.5 million hectares of land and contributing significantly to the country's economy. However, smallholder farmers in Tanzania face several challenges in maize production, including the limited availability of quality seeds, poor infrastructure, and support services, limited access to credit, and the effects of climate variability and change, such as drought and pests and diseases.

The purpose of this study is to examine factors affecting among farmers in maize production in Mzumbe ward and propose potential solutions that can be implemented to enhance the productivity and profitability of maize production. Specifically, the study will address the following research objectives

2.0 Theoretical Literature Review

Maize is an essential crop for food security and economic development in many countries. The production of maize plays a significant role in the livelihoods of smallholder farmers, who often face numerous challenges that limit their productivity and profitability. In this literature review, we examine the factors affecting maize production, drawing upon recent research and seminal works in the field.

Resource Availability, The availability of resources such as land, labor, and capital is a significant determinant of maize production among smallholder farmers (Worku, 2020). According to Chibanda et al. (2019), access to productive resources is limited in many countries, which hinders agricultural productivity and contributes to poverty. Therefore, ensuring access to resources is crucial for enhancing maize production and achieving food security (Hazell & Norton, 2018).

Technology Advancements in agricultural technology have the potential to improve productivity and reduce costs for smallholder farmers (Etwire et al., 2019). However, smallholder farmers often face challenges in accessing relevant technologies due to high costs and inadequate knowledge transfer (Acheampong et al., 2020). Therefore, there is a need to provide smallholder farmers with appropriate and affordable technologies to enhance their maize production (Amanor- Boadu et al., 2018).

Market Demand, The demand for maize in local and international markets can affect the productivity and profitability of smallholder farmers (Bellon et al., 2019). A significant driver of market demand is the population growth, which implies greater demand for maize and other food crops. However, fluctuations in supply and demand can affect maize prices, thereby influencing farmers' decisions to invest in maize production (Shiferaw et al., 2019).

Input and Output Prices The prices of inputs such as seeds, fertilizers, and pesticides influence the costs of maize production (Mvumi et al., 2020). High input prices can limit smallholder farmers' access to necessary inputs and, in turn, affect their productivity. Similarly, maize prices play a significant role in determining farmers' profitability. Low maize prices can discourage farmers from investing in maize cultivation (Marenya & Barrett, 2019).

Climate variability, including droughts and floods, can significantly affect maize cultivation

(Frelat et al., 2019). Smallholder farmers often lack the necessary resources and capacity to adapt to such changes, which can result in crop failures.

2.1 Research gap

Acheampong et al. (2020) is informative in examining access to agricultural technologies and extension services in Ghana, there is a need for more research that focuses specifically on how different types of technology and extension services impact maize production. Technology and extension services can play important roles in improving maize productivity, particularly in addressing issues such as pests and diseases, soil fertility, and weed management. Further research can explore the specific technologies and extension services that are most effective in enhancing maize production, and the factors that influence farmers' adoption and use of these technologies and services. By gaining a better understanding of the role that technology and extension services play in maize production, policymakers and practitioners can develop more targeted interventions to promote sustainable and inclusive agriculture.

Lack of attention to social and economic factors: Studies such as Alene et al. (2018) and Frelat et al. (2019) provide insights into how factors such as gender, household dynamics, and market linkages can influence agricultural outcomes. Alene et al. (2018) and Frelat et al. (2019) have shed light on the social and economic factors that influence agricultural outcomes. However, there has been limited attention paid to understanding how such factors impact maize production specifically. As noted by Hazell and Norton (2019), income levels and farm size can impact access to resources and technologies, which can influence the ability of smallholder farmers to adopt and implement improved practices that can enhance maize productivity. Gender inequalities can limit women's access to land and resources, thereby affecting their participation in maize production. To address this research gap, further studies can explore the specific pathways through which income, gender and farm size impact maize production and the policy interventions that can promote sustainable and inclusive agriculture.

The studies by Amanor-Boadu et al. (2018) and Bellon et al. (2019) focus on the adoption of drought-tolerant maize varieties, but the impact of environmental factors such as soil quality and climate change on maize production is an area that requires further research.

Environmental factors such as soil fertility and pest infestation can directly affect maize yields while climate change can lead to erratic rainfall patterns, increased temperatures, and extreme weather events, all of which can affect agricultural productivity. Understanding how these environmental factors affect maize production and identifying effective measures to mitigate their impact can help policymakers and practitioners design and implement sustainable and resilient farming practices. Therefore, further research is needed to explore the relationship between environmental factors and maize production and design interventions that can ensure sustainable agricultural practices in the face of climate change.

Hazell and Norton (2019) this has shown a gap on the resources availability. Income levels and farm size to access to resources and technologies that can enhance maize productivity. However, further research is needed to explore the relationship between resource availability and maize production in different geographical contexts. Specifically, resource availability can vary significantly depending on factors such as climate, soil type, and availability of inputs such as fertilizer and seeds. Therefore, there is a need for more context - specific research that can provide insights into how resource availability affects maize production and how interventions can be designed to address resource constraints in different contexts. By gaining a better understanding of the relationship between resource availability and maize production, policymakers and practitioners can develop more targeted interventions to promote sustainable and inclusive agriculture.

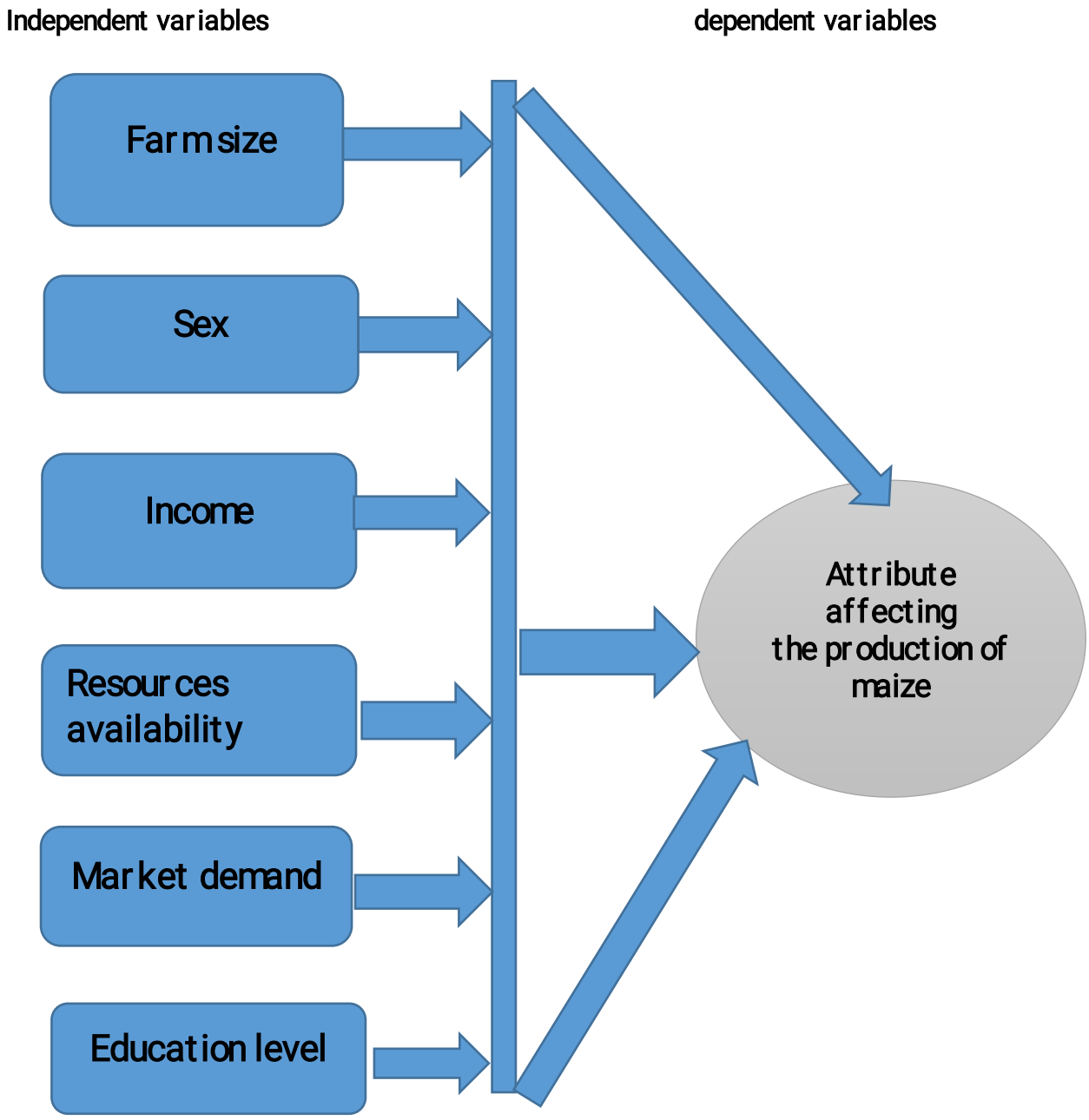
2.2Production theory

According to scope our research we are going to use production theory as theory which will guide our research

The theory of production can be applied to analyzing the factors affecting maize production. Specifically, the theory highlights the importance of inputs such as land, labor, capital, and technology in enhancing maize yields. Land quality, availability and ownership can affect yields, while labor quantity, quality and efficiency can influence productivity. Capital, including inputs such as seeds, fertilizer, and machinery, can enhance yields and improve efficiency, while technology, including innovations such as drought- tolerant varieties and precision farming techniques, can increase yields and improve resource efficiency.

Figure 1. Conceptual frame work

This has been used to show the relationship between the factors affecting the production of maize in Mzumbe ward with factors which affect production include, farm size, sex an income and others



Research field 2023

METHODOLOGY

3.1 Study area

The study area in research methodology refers to the geographical location where the research is conducted. It can be a specific region, city neighborhood or even a single building or facility the study should be clearly defined and described in the research study as it can have an impact on the result of the study.

According to our research we have collected data in the following areas, Changarawe, Mahakamani, Oyster Bay, Geti kubwa and Mzumbe in Mzumbe ward

We collected data in Mzumbe ward to test hypothesis, this was an essential part of the research process as it allowed us to observe and measure the variable of interest in a systematic and controlled way. The data collected helps to provide evidence for or against the research question or hypothesis being tested and can be used to draw conclusion and make recommendation

3.2 data collection

Questionnaires were administered and designed to acquire relevant information. This involved the engagement of the researcher with the communities in the study area at the farming scheme in an attempt to unpack the challenges with the intention of shedding light on outcomes such as improved farm income, and entrepreneurial attributes of small holders farmers.

3.3 sampling strategy

The research obtained a sampling frame of small- scale farmer in the schemes from the small farmers. Stratified random sampling was used to select the participants and a total of 25 smallholder farmers growing cabbage were interviewed. Input – output data were collected at the plot level. Poverty is more severe in rural areas where gender is a major factor in household decision- making (Cheteni et al., 2019). That is why women are over- represented among the rural poor. Also, out of the total 25 sampled farmers, 15 were male and 10 were

female. In addition, maize farmers were sampled owing to the importance of the crop in the irrigation schemes.

3.4 Sample size

This part include the number of people who were involved during the data collection for our conduction we used 25 people whereby we asked their level of production various farming technique on maize production .hence this was a beginning party of our study which took us further more on other stages of research

3.5 Empirical model

Empirical model, according to our study we used Ordinary Least Squares (OLS) regression model, which is a statistical method for analyzing and modeling the relationship between a dependent variable and one or more independent variables. In this method, a linear function is fitted to the data points that best represent the relationship between the variables, using a technique of minimizing the sum of the squared distance between the observed data points and the fitted line.

It was used to determine and estimate the effect of different factors or variables on a dependent variable, for instance we have OLS model to find the factors affecting the production of maize in Mzumbe ward

Functional form

$$Y=\beta_0+\beta_1 farm\ size+\beta_2 income+\beta_3 sex+\beta_4 resource\ availability+\beta_5 market\ demand+\mu$$

$$Production\ of\ maize = -2.231+0.5054fs+0.000264Y+0.4663M+1.1712H+0.7908Md+\mu$$

Where

Fs= farm size

y= income

Sex (1 = male 0 = female) where M is male

Resource availability (1= high 0 = low), where H is high availability

Market demand (1= high 0 = low), where H is high demand

μ = error term

PRESENTATION OF FINDINGS

4.1 Introduction

An introduction to a presentation or research paper serves to introduce the topic to the audience and give them a brief overview of what will be covered. It should also set the context for the research or analysis that will be presented. The introduction should provide enough background information so that the audience can understand the significance of the work and why it is important.

4.2 Data analysis

Data analysis is the process of systematically examining and interpreting data in order to extract useful insights and inform decision-making. It involves cleaning, transforming, and modeling data to discover patterns, trends, and relationships, and communicating those findings in a clear and meaningful way.

Table 1: Table of results from the field

Variables	Multiple linear regression model
Farm size in acre	0.5054114***
	(0.1224027)
income	0.0002636***
	(0.0000577)
sex (male)	0.4663869
	(0.410082)

resources availability	1.17122*** (0.3625906)
market demand	0.7908211** (0.3616976)
constant	- 2.231218*** (0.681059)
Model strength	
Number of observation R square Chi square	25 0.9427 0.0000 *p<0.1, **p<0.05, ***p<0.01 Standard errors in the parenthesis

Stata output (2023)

Table 2: Variability measurability

This was measurement used to show how variables were measured in various ways, were some data were taken and measured as continuous variables while others were measured as categorical (dummy variables)

Variable name	Type of variable	Measurement	Expectation sign
Dependent variable	continuous	Number of tonne	Positive
Independent variables			
Income	continuous		Positive
Farm size	continuous	Acre	Positive
Sex	categorical	1= if farmer is male 0= if farmer is female	Positive
Resources availability	categorical	1=high availability 0= other wise	Positive
Market demand	Categorical	1= high demand 0=low demand	Positive

Source; Field data (2023)

Table 3: Descriptive statistics of the data

This was a descriptive kind of statics which was made so as to determine which variable occurred mostly or has got larger frequency on the farm size (dependent variable)

farm size in acres	Frequency	Percent	Cumulative percentage
3	2	8	8
4	3	12	20
5	3	12	32
6	3	12	44
7	3	12	56
8	3	12	68
9	2	8	76
10	3	12	88
12	3	12	100
Total	25	100	100

Source; Field data (2023)

Table 4: Summary of the data for the farm size

This was also kind of descriptive statistics, which was done to know the characterizes of the data o obtained from the field, where the maximum number of acre was 12, and the min number of acre was 3, as the mean acres for both farmers was 7.2 and their deviation from their (standard deviation) was 2.78

Variable	Observation	Mean	Std. Dev.	Min	Max
farm size in acre	25	7.2	2.783882	3	12

Source; Field data (2023)

DISCUSSION OF FINDINGS

5.1 Discussion of the results

we estimated coefficients for a linear regression model with "production in tonne" as the dependent variable and "farm size in acre", "income", "sex", "resource availability", and "market demand" as the independent variables.

Table 5: Table of results

Variables	Multiple linear regression model
Farm size in acre	0.5054114***
	(0.1224027)
income	0.0002636***
	(0.0000577)
sex	0.4663869
	(0.410082)
resources availability	1.17122***
	(0.3625906)
market demand	0.7908211**
	(0.3616976)
constant	- 2.231218***
	(0.681059)
Model strength	

Number of observation	25
R square	0.9427
Chi square	0.0000
	*p<0.1, **p<0.05, ***p<0.01
	Standard errors in the parenthesis

5.1.1 Farm size the coefficient of "farm size in acre" is 0.5054 with a standard error of 0.1224 and a t- value of 4.13. This means that, holding all other independent variables constant, a one- unit increase in "farm size in acre" is associated with a 0.5054 increase in "production in tonne". The coefficient is statistically significant at a 0.001 level, indicating that this result is unlikely to have occurred by chance alone.

5.1.2 Income The coefficient of "income" is 0.0003 with a standard error of 0.00006 and a t- value of 4.57. This means that, holding all other independent variables constant, a one- unit increase in "income" is associated with a 0.0003 increase in "production in tonne". The coefficient is also statistically significant at a 0.000 level.

5.1.3 Sex The coefficient of "sex" for the "male" category is 0.4664 with a standard error of 0.4101 and a t- value of 1.14. This indicates that being male is not statistically significant in explaining the variation of "production in tonnes" as the p- value is greater than 0.05.

5.1.4 Resource availability, the coefficient of "resource availability" for the "high" category is 1.1712 with a standard error of 0.3626 and a t- value of 3.23. This means that, holding all other independent variables constant, the "high" resource availability level is associated with a 1.1712 increase in "production in tonnes". The coefficient is statistically significant at a 0.004 level.

5.1.5 Market demand, the coefficient of "market demand" for the "high" category is 0.7908 with a standard error of 0.3617 and a t- value of 2.19. This means that, holding all other independent variables constant, the "high" market demand level is associated with a 0.7908 increase in "production in tonnes". The coefficient is marginally statistically significant at a 0.042 level

5.1.6 Constant The intercept term, represented by "_cons", is a coefficient in the regression

equation that represents the predicted value of the dependent variable when all independent variables are equal to zero. In this case, the intercept term is - 2.2312, which means that when all other independent variables are zero, the predicted value of "production in tonnes" is - 2.2312.

The standard error of the intercept term is 0.6811, which is a measure of the variation or uncertainty in the estimated coefficient. A larger standard error indicates greater uncertainty in the estimated coefficient, while a smaller standard error indicates a more precise estimate.

SUMMARY, CONCLUSION AND POLICY RECOMMENDATION

6.1 Conclusion

Based on the regression results shown, several variables in Mzumbe ward have significant effects on production of maize by farmers. Farm size in acres and income both have positive coefficients, suggesting that larger farm sizes and higher income levels are associated with higher maize production. Further, resource availability and market demand both have positive coefficients, while the sex variable does not appear to have a significant effect on maize production in this context.

6.2 Policy implication

Based on the regression results on the factors affecting production of maize among farmers in Mzumbe ward, two policies that may improve maize production are:

1. Increase farm size and income levels, the regression results indicate that farm size in acres and income are significant predictors of production in tonnes. Therefore, policymakers could consider providing support to help small farmers acquire more land and improve their income levels. Such support could include access to credit, extension services, and training on farm management practices.
2. Improve access to resources and markets, the regression results indicate that

resource availability and market demand are significant predictors of production in tonnes. Therefore, the authorized institution could consider implementing policies that improve farmers' access to resources such as water, inputs, and equipment, and policies that improve access to markets. This could include investment in infrastructure to improve transportation links.

Generally, these policies could have a positive impact on maize production in Mzumbe ward, as they target important factors that affect farmers' ability to produce and market their crops. Although further research may be required to fully understand the effectiveness of these policies, the results of this study suggest that such policies could be effective in increasing maize production.

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