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Original Article

Agricultural Price Fluctuation and Its Effects on Small-Scale Farmer Income: A Case of Maize Crop in Kilolo District

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Keywords:

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And Maize Price
Stability.

This study examined the agriculture crop price fluctuation and its effects on small-scale farmer income in Tanzania, specifically in Kilolo District in Iringa Region. The study sampled 90 respondents, where 84 respondents were for structured questionnaire and 6 for interviews. Simple random sampling and purposive sampling techniques were used to collect data. The mixed-methods data were analysed using linear regression estimation techniques, estimated Ordinary Least Squares estimator, and content analysis for qualitative data. The study revealed that Agriculture cash crops positively influence the yearly income of small-scale farmers, signifying that increased engagement in cash crop cultivation contributes to higher income levels for these farmers. Conversely, the study unveiled the negative implications of crop price fluctuations on small-scale farmers' yearly income, demonstrating that erratic price variations can substantially challenge their economic stability. These findings were robustly supported by statistical analyses, including the t-test and regression analysis, which underscored the significance of Agriculture cash crops and crop price fluctuations as determinants of small-scale farmers' yearly income. The adjusted R^2 value of 0.607 further substantiated these results, signifying that the independent variables, Agriculture cash crops, and crop price fluctuations account for approximately 60.7% of the variation observed in the dependent variable. In such a sense, small-scale farmers' yearly income is determined by agricultural cash crops done by small-scale farmers and the crop prices fluctuation in the markets. There is a need for marketing officers to provide marketing information to small-scale farmers from time to time for small-scale farmers to be aware of cash crop price fluctuations and what kind of cash crops will have a higher market value, hence lowering the level of price fluctuation in the markets. Such a move would increase small-scale farmers' yearly income in Kilolo District.

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INTRODUCTION

In the global context, small-scale farmers supply about 80% of Agriculture crop production and account for about 45% of the total GDP (Gollin, 2010). However, there has been widespread concern about global Agriculture crop price fluctuations. Small-scale farmers are the backbone of global Agriculture, but they face a significant challenge in the form of volatile crop prices. Furceri et al. (2016) observed the trends of Agriculture crop price fluctuation in different regions of the world. In 2020, 2021, and 2022, there have been three periods of sharply rising global Agriculture crop prices, respectively. The increases in Agriculture crop prices have been associated with climatic changes, diseases, rapid population growth, increasing demand and supply, and increasing economic growth. Crop price fluctuations are influenced by a complex interplay of factors, including climate change, diseases, and shifts in supply and demand, which have occurred prominently in recent years.

A study by Allen et al. (2015) shows that small-scale farmers are losing about US \$28 per hectare per year for each 1°C temperature rise, and it is estimated that there will be a decline of about 55% in crop yield from rain-fed Agriculture by 2025 in some countries due to climatic changes. Climate change is particularly detrimental to small-scale farmers, leading to financial losses and reduced crop yields, exacerbating the challenge of price fluctuations. The changes in Agriculture crop prices affect small-scale farmers' income, particularly in production and purchases. Crop price fluctuations impact small-scale farmers through reduced income from their produce and influence their purchasing power for essential goods.

Similarly, agricultural crop prices in Africa often go through roller-coaster variations, with surges followed by collapses (Galtier, 2017). The changes in Agriculture crop prices in African countries have been the most serious. The changes have been associated with various factors such as climatic change, population growth, Agriculture crop insecurity, and rapid demand and supply. Africa experiences extreme fluctuations in Agriculture crop prices, primarily driven by climate change, population dynamics, food security issues, and supply and demand imbalances. Consequently, the instability of agricultural crop prices led to declining agricultural crop production in African countries. Agriculture crop price fluctuations have adverse effects on crop production in Africa, as exemplified by the instability in millet, agriculture, and sorghum prices in Mali, Kenya, and Uganda.

A study conducted by Okou et al. (2022) suggested that the adaptive ways to address Agriculture crop price fluctuation are dynamic and determined by multiple factors such as providing targeted and sustained social protection programs, supporting multilateral emergence solutions to offer liquidity to developing countries, relieving developing countries from their financial burden and maintain open international markets. Addressing Agriculture crop price fluctuations requires multifaceted approaches, including social protection, international cooperation, and financial support for developing countries.

However, the government in Tanzania, under the Ministry of Agriculture, has been taking several measures to control Agriculture crop price fluctuation (Minot, 2015). Deregulation of the

Agriculture crop grain market, favorable environmental policies on agricultural output, and price support for export crops are examples of such measures. The Tanzanian government has implemented various measures to manage Agriculture crop price fluctuations, including deregulation, environmental policies, and support for export crops.

Like many other African countries, Agriculture is the driving force of the economy of Tanzania, contributing about 26% of the country's GDP (Lowder et al., 2021). According to FAO (2022), about 20 million people in Tanzania are small-scale farmers who contribute approximately 4% of the farms, accounting for about 80% of the total. Agriculture plays a vital role in Tanzania's economy, with a significant portion of the population engaged in small-scale farming despite their relatively small contribution to the total number of farms.

For instance, the country experienced serious Agriculture crop price fluctuation during the 2011–2017 period due to a prolonged drought that increased Agriculture crop costs, leading to US \$200 million for Agriculture crop imports and distribution (FAO, 2022). Agriculture crop price fluctuation led to Agriculture crop shortages and starvation in 2016. Tanzania's experience during the 2011–2017 period highlights the devastating impact of Agriculture crop price fluctuations, particularly when compounded by factors like drought, resulting in food shortages and hunger.

General Objective

The main objective of this study was to examine the agriculture crop price fluctuation and its effects on small-scale farmers' incomes in Tanzania, specifically in Kilolo District in Iringa Region.

Specific Objectives

- To examine the effect of agricultural cash crops on small-scale farmers' income in Kilolo District.

- To investigate the effects of Agriculture crop price fluctuation on small-scale farmers in income Kilolo District.

LITERATURE REVIEW

Theoretical Literature Review

The Demand and Supply Theory

The Demand and Supply Theory was formulated by Alfred Marshall in 1890 as one of the cornerstones of economic thought. This theory provides a fundamental framework for understanding how demand and supply influence the prices of goods and services in a market. This theory elucidates the delicate equilibrium between consumer preferences and producer capabilities (Safiullin, 2015). The Law of Demand: This law asserts that all else being equal, as the price of a commodity rises, the quantity demanded by the consumer decreases, and conversely, as the price falls, the quantity demanded increases. In the context of Agriculture crop price fluctuations, the Law of Demand highlights price's critical role in influencing consumer behavior. When crop prices surge, particularly staple crops that form a significant portion of rural diets, consumers may reduce their purchases, impacting food security and nutrition (Safiullin, 2015). This can have direct implications for small-scale farmers who rely on local demand.

Marshall's theory articulates that the dynamics of demand and supply are intricately linked and exert a pivotal influence on market prices. The essence of this theory can be briefly summarized: when the supply of a commodity surpasses the level of demand, prices tend to decrease, while an excess of demand over supply tends to push prices upward (Hildebrand, 1994). In the context of Agriculture crop price fluctuations, the Demand and Supply Theory provides an indispensable lens through which to analyze the forces at play. Fluctuations in crop prices can often be traced back to imbalances between the quantities of crops supplied and the quantities demanded in the market. When supply outpaces demand due to factors such as increased production or favorable weather conditions, prices may experience

downward pressure, impacting the incomes of small-scale farmers.

Therefore, the choice of this theory was important because it helps to explain the causes that influence Agriculture crop price fluctuation in context. For instance, when demand exceeds supply, prices tend to rise. However, the theory explains the relationship between consumer demand and the market price of goods and services. The theory also provides a framework for developing ethical Agriculture crop price fluctuation. Generally, the theory was relevant in describing and explaining the effect of Agriculture crop price fluctuation on small-scale farmers in Kilolo District.

The Price Elasticity of Demand Theory

In the realm of economics, the Price Elasticity of Demand Theory emerges as a pivotal framework that complements the Demand and Supply Theory. The Price Elasticity of Demand Theory delves into the nuanced relationship between price changes and consumer responsiveness (Ekelund & Hébert, 1999). Within the context of Agriculture crop price fluctuations, this theory unveils critical insights into how price shifts affect crop demand, carrying profound implications for small-scale farmers in regions like Kilolo District.

At the heart of the Price Elasticity of Demand Theory lies the concept of price elasticity, a measure denoted by “Elasticity,” which quantifies the sensitivity of consumer demand to price alterations. Price elasticity can assume various classifications, each indicative of distinct consumer behaviors: Elastic Demand (Elasticity > 1): Elastic demand signifies that consumers are highly responsive to price changes. In such instances, a slight increase in the price of a good or service results in a proportionally larger decrease in the quantity demanded. Conversely, a price reduction yields a substantial increase in demand (Smith & Jones, 2018).

The concept of elastic demand carries profound implications for small-scale farmers. Crops with elastic demand can present a double-edged sword in regions like Kilolo District, where rural

consumers may have limited disposable income. While price increases may lead to reduced sales, price decreases can attract more buyers (Ekelund & Hébert, 1999). Understanding the elasticity of demand for specific crops becomes vital for strategic planning. Inelastic Demand (Elasticity < 1): Inelastic demand implies that consumers are relatively unresponsive to price fluctuations. In this scenario, price changes have a limited impact on the quantity demanded.

For crops with inelastic demand, small-scale farmers may not observe significant variations in sales volumes due to price fluctuations. However, this also means that consumers do not substantially increase their purchases when prices fall, potentially leaving farmers with reduced incomes (Smith & Jones, 2018).

In summation, the Price Elasticity of Demand Theory emerges as a pivotal tool in the Agriculture crop price fluctuations study. Beyond the fundamental interplay of supply and demand, this theory delves into the intricate dynamics of consumer responsiveness to price changes. Its application in the context of small-scale farmers in regions like Kilolo District unveils essential insights for policymakers, stakeholders, and farmers alike. By comprehending the elasticity of demand for specific crops, strategies can be devised to foster economic stability, improve small-scale farmers' livelihoods, and ensure food security.

Empirical Literature Review

Effect of Agriculture Cash Crops on Small-Scale Farmers' Income

Carrasco and Mukhopadhyay (2019) studied “Food Price Fluctuation in South Asia”. A cross-sectional study was employed, and data were collected from 100 small farmers. Descriptive and correlation analyses were used to analyze data collected using questionnaires. They found that Per capita income has a positive relationship to cash crop price inflation via increasing purchasing power of the money in the hands of the people, which leads to a surge in demand for crop items, resulting in a rise in Agriculture crop prices. They

argued that per capita income positively affected Agriculture crop prices in three South Asian economies. However, the decline in agricultural production increases Agriculture crop prices, and magnitudes vary across countries. They also find that a 1 percent surge in per capita income upsurges the demand for fruits, vegetables, milk, and edible oil by 0.55–0.65 percent and animal products by 0.38 percent. However, it reduces the demand for cereals and pulses by 0.05 percent and 0.20 percent, respectively.

Mellor and Dar (2020) studied “*Determinants and Development Implications of Agriculture Crops Grains Prices in India.*” Purposive sampling technique was applied to obtain a sample of 80 respondents. Data analysis was done quantitatively through regression analysis. They found that the expansion of the money supply largely determines upward pressure on Agriculture crops and grain prices. They also added that an increase in the money supply positively affects Agriculture crop price inflation through market credit facility by generating aggregate demand. However, it reduces Agriculture crop prices by creating investment via availing credit to the producer.

Effect of Agriculture Crops Price Fluctuation on Small-Scale Farmers' Income

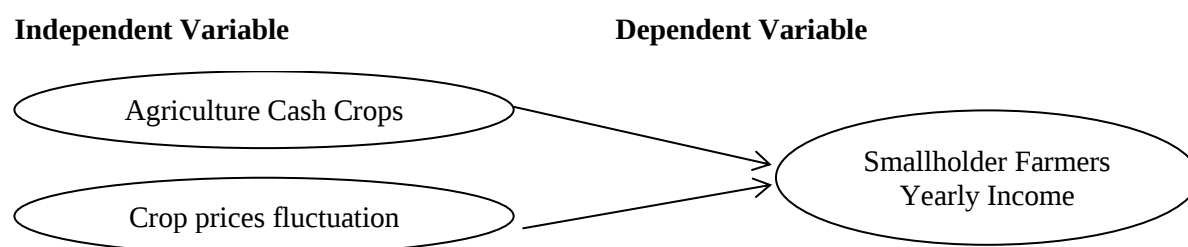
Fafchamps and Marcel (2020) studied “*Farmers and Price Fluctuations in Poor Countries: World Bank Working Paper.*” The study used a cross-section design and applied a convenience sampling technique to obtain a sample of 60 individuals who participated in farming activities. Data analysis was done qualitatively through content analysis. The study found that Agriculture crop prices are a primary determinant of consumption patterns, and high Agriculture crop prices may have important negative effects on nutritional status and health, especially among poor people. The global Agriculture crop price

crisis of 2007-2008 focused international attention on the impact of changes in Agriculture crop prices on nutrition and health. Estimates from the United Nations Agriculture Crops and Agriculture Organization suggest that in 2008, an additional 40 million people were pushed into hunger by the global rise in cereal prices, and evidence is accumulating that dietary diversity and quality have been negatively affected by Agriculture crops price rises, particularly among the poorest. In contrast, the governments of wealthy countries are increasingly adopting fiscal measures that change the relative price of crops to promote healthy diets.

Hadley et al. (2021) studied “*Rapidly Rising Agriculture Crops Prices and the Experience of Agriculture Crops Insecurity in Urban Ethiopia.*” The study employed a cross-sectional design, and primary data were collected from 50 employees. Data analysis was done qualitatively and quantitatively through content and descriptive analysis. The study found that price fluctuation in agricultural produce stressed the consequences of the agriculture crops crisis on the overall social structure. Many interviewees reported that the situation prevented them from participating in the community's social life. For instance, the tradition goes that people who attend funerals prepare some crops that they bring to the deceased's family. Several people gave up attending social rituals because they had nothing to get to the practice. Similarly, it became more complicated to share Agriculture crops items, let alone meals, with relatives or neighbours, thus distorting the social networks and further insulating the poorest from the community.

Conceptual Framework

Figure 1 shows the likely relationship between Agriculture crop price fluctuation and small-scale farmers' production.

Figure 1: Conceptual Framework

Source: Researcher Construction (2023).

RESEARCH METHODOLOGY

This study was carried out in Kilolo District, Iringa Region in Tanzania. Kilolo District is one of four districts that form the Iringa region of Tanzania. Kilolo District was chosen because many small-scale farmers lose hope of farming due to high crop price fluctuation, which increases the price of inputs such as fertilizer, high transportation costs, high labor charges, etc. Many small-scale farmers depend on farming, but due to price fluctuation, they make losses (KDC Profile, 2023). The study used a mixed-methods research approach. Therefore, quantitative and qualitative methods guided the investigation in the current study to obtain in-depth information from the study participants and statistical data from respondents. This study employed both quantitative and qualitative data. This study's total population comprised 901 small-scale farmers, supplier officers, and marketing officers from Kilolo District (KDC Profile, 2023). Whereby, small scale farmers comprised of 848 small scale farmers, marketing officers were 50 and district Agriculture extension officers were 12. A sample of 90 respondents (small-scale farmers, district Agriculture extension officers and marketing officers from Kilolo District) was drawn using the Yamane (1967) formula with precision of $\pm 10\%$.

$$n = \frac{N}{1 + N(e)^2}$$

Where e = Margin of error; N = the total number of populations; n = the number of sample selected

$$n = \frac{901}{1 + 901(0.1)^2}$$

$$n = 90$$

The sample size of this study was 90 observations as indicated.

The study employed both simple random sampling and purposeful sampling techniques. The study area and respondents were chosen using the Purposive sampling technique, whereby 30 key informants from each village were selected. In this study, both primary and secondary data were collected. For the purpose of the study data collected through interview and documentary review. This study used content analysis to analyze qualitative data, and Linear Regression Analysis was used for quantitative data.

The following table show the distribution of that 90 observants ;

Table 1: Sample size distribution

	Total population	Sampling frame
Small scale Farmers	848	$\frac{848}{910} \times 90$ 84
Marketing officers	50	$\frac{50}{910} \times 90$ 5
District Agriculture extension officers	12	$\frac{12}{910} \times 90$ 1
Total	910	90

Type and Source of Data

This study used both primary and secondary data as discussed below.

Primary Data

Primary data was collected through structured questionnaires which were distributed to 84 respondents for quantitative data collection. Furthermore, in-depth interviews were administered to 6 participants during primary data collection respectively.

Secondary Data

Secondary data is information that has already been collected by someone else and has already been passed through the statistics process (Kothari, 2008). Secondary data were collected using official published documents, organizational documents, and academic outputs, including dissertations and theses, journals, research reports, and textbooks.

Data Collection Methods

Data collection methods are tools which are used to collect data. In this study I employed structured questionnaire to gain the data concerning small Scale Farmers' yearly income, agriculture Cash Crops and crop Prices Fluctuation from 84 farmers. Furthermore, interviews were used as means of collecting data.

Data Analysis

In this study content analysis was used to analyse qualitative data. For quantitative data, Linear Regression Analysis and Ordinary Least Square Estimator as a technique of analysis as was used by among others. Linear Regression analysis was

based on the model showing relationship between small scale farmers' yearly income as dependent variable and Agriculture cash crops and crop prices fluctuation as independent variables, that is,

$$SFY = f(ACC, CPF)$$

Where, SFY = Small Scale Farmers' yearly income; ACC= Agriculture Cash Crops; CPF= Crop Prices Fluctuation

And

$$\frac{dSFY}{dACC} > 0 \text{ and } \frac{dSFY}{dCPF} < 0$$

The model was specified as linear, thus:

$$SFY = \beta_0 + \beta_1 ACC + \beta_2 CPF + \mu$$

Where β_0 is the intercept, β_1 is the coefficient of Agriculture cash crops, β_2 is the crop prices fluctuation, and μ = Disturbance term.

Moreover, Statistical Package for Social Sciences software (SPSS V. 20) was used to run the analysis using ordinal least square estimator and help to reach the conclusion of the study.

Validity of the Study

Table 2 below is Bartlett's Test of Sphericity, which shows that the data variables obtained after the data reduction process were significant (0.001) to measure the dependent variable with a Kaiser-Meyer-Olkin value of 0.754. Kaiser states that the results from factor analysis can be considered acceptable if the Kaiser-Meyer-Olkin value (KMO) is 0.5 or greater. Bartlett's test of sphericity is statistically significant, with a P-value of 0.001. Since the P-value is < 0.05, Factor Analysis is valid. The researcher is confident that factor analysis is appropriate for these data.

Table 2: KMO and Bartlett's Testa

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.754
Bartlett's Test of Sphericity	Approx. Chi-Square	134.247
	Df	3
	Sig.	.001

Source: Research findings, (2023)

Reliability of the Study

The study's findings in the table below show that the alpha coefficient for the four variables (items)

is 0.867, indicating internal consistency between small-scale farmers' yearly income, Agriculture cash crops, and crop price fluctuation.

Table 3: Reliability statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.834	.867	3

Source: Research findings, (2023)

FINDINGS AND DISCUSSION**Descriptive Statistics**

The following were data (Table 4) concerning agricultural cash crops, Scale Farmers' yearly

income, and crop Prices Fluctuation from 84 farmers form Kilolo district. This datas were potentially used ot run the regression analysis so as to find out the dualy relationship.

Table 4: Descriptive statistics on Farmers small Scale agriculture cash crops, Farmers' yearly income and crop Prices Fluctuation

S/N.	Number of bags of cash crops per acre	Variation of prices per month per cash crop (%)	Level of yearly income per acre
1	34	3.40	2265800.00
2	45	3.60	2457280.00
3	45	3.90	3095180.00
4	39	3.70	2609060.00
5	36	3.70	2500810.00
6	36	3.50	3841710.00
7	45	3.40	2529090.00
8	45	3.40	2374120.00
9	42	3.40	3700760.00
10	32	3.20	2365470.00
11	34	3.40	2407450.00
12	53	3.70	3541480.00
13	39	3.20	2389090.00
14	43	3.60	2528110.00
15	44	3.30	3163500.00
16	48	3.30	2904600.00
17	45	3.50	2560000.00
18	36	3.60	3750990.00
19	38	3.40	2684100.00
20	47	3.40	2542910.00
21	49	3.40	3236920.00
22	48	3.20	2603800.00
23	45	3.60	2535790.00
24	44	3.20	3511880.00
25	43	4.20	1813810.00
26	44	4.20	1549390.00
27	47	3.50	2543200.00
28	51	5.30	1850600.00
29	48	4.70	1624890.00
30	36	3.40	2760810.00
31	32	3.30	1872880.00
32	34	4.40	1750200.00
33	34	3.40	2556210.00
34	39	3.40	1741190.00
35	33	3.20	1848990.00

S/N.	Number of bags of cash crops per acre	Variation of prices per month per cash crop (%)	Level of yearly income per acre
36	41	3.40	3556990.00
37	41	4.40	1848990.00
38	46	3.30	3511880.00
39	42	5.40	1015900.00
40	46	4.60	1844500.00
41	48	3.80	1198181.00
42	49	4.40	1964810.00
43	52	3.20	2475590.00
44	46	4.30	1875410.00
45	41	4.40	1813690.00
46	39	3.40	1937200.00
47	38	3.40	1901400.00
48	39	3.50	1689610.00
49	40	4.70	1246000.00
50	41	4.70	1813690.00
51	41	3.60	2173233.57
52	35	3.10	2515686.06
53	30	3.30	3239050.04
54	31	3.30	2693208.44
55	29	3.60	2881103.57
56	36	3.30	3930940.20
57	39	3.40	2847885.10
58	40	3.60	2387671.29
59	45	3.40	3545859.77
60	43	3.50	2766298.97
61	47	3.70	3020601.99
62	48	3.40	4188708.30
63	51	4.60	1530910.00
64	34	3.20	2248990.00
65	41	4.40	3556990.00
66	41	4.40	2148990.00
67	46	3.30	3311880.00
68	42	5.40	915900.00
69	46	4.60	1844500.00
70	48	3.80	1298181.00
71	49	4.40	1764810.00
72	52	3.20	1975590.00
73	46	4.30	1775410.00
74	41	4.40	2013690.00
75	39	3.40	1637200.00
76	38	3.40	1401400.00
77	39	3.50	1389610.00
78	40	4.70	1746000.00
79	41	4.70	1913690.00
80	41	3.60	2373233.57
81	35	3.10	1715686.06
82	30	3.30	3139050.04
83	31	3.30	2893208.44
84	29	3.60	2481103.57

Multi-Regression Analysis

The research conducted a multiple linear regression analysis to examine how independent variables (Agriculture cash crops and crop price fluctuation) affect the dependent variable (small-scale farmers' yearly income).

Multiple regression analysis allows for examining how two or more independent variables collectively influence a single dependent variable. The table below presents the findings of this analysis.

Table 5: Model summary

Model	R	R ²	Adjusted R ²	Std. Err of the Estim.	Change Statistics					Durbin-Watson
					R ² Change	F Change	df1	df2	Sig. F Change	
1	.719 ^a	.634	.607	.73712	.712	22.418	2	60	.000	2.541

Source: Research findings, (2023)

The findings in Table 5 above show that the total variations in the dependent variable, i.e., small scale farmers' yearly income, are caused by variations in the independent variables, i.e., Agriculture cash crops and crop prices fluctuation. In the case of the regression output, the adjusted R² = 0.607, implying that the model explains about 60.7% of the variations in the small-scale farmers' yearly income in Kilolo District. Also, since the R coefficient is 0.719, it

means that there is a correlation of 71.9% between the independent variables (Agriculture cash crops, crop prices fluctuation) and the dependent variable (small-scale farmers' yearly income). This shows that the independent variables (Agriculture cash crops and crop prices fluctuation) significantly predict the dependent variable (small-scale farmers' annual income) in Kilolo District.

Table 6: Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	.521	.514		2.047	.000
Agriculture cash crops	.547	.563	.529	3.246	.013
Crop prices fluctuation	.731	.668	.534	4.275	.000

Source: Research findings, (2023)

The estimated regression model indicates that a unit increase in Agriculture cash crops leads to a change of 0.547 in small-scale farmers' yearly income. A one percentage change in crop price fluctuation leads to a rise of 0.723 in small-scale farmers' annual income. All two parameter estimates are statistically significant at the 5% level. However, all algebraic signs of the parameter estimate for Agriculture cash crops and crop price fluctuation conform to the hypothesized signs.

DISCUSSIONS

The Effects of Agriculture Cash Crops on Small-Scale Farmers' Yearly Income

This study revealed that Agriculture cash crops have a positive and significant effect on small-scale farmers' yearly income since the p-value was less than 0.05. If small-scale farmers increase their production of Agriculture cash crops, the small-scale farmers' annual income will rise. The higher output of agricultural cash crops affects small-scale farmers' income; therefore, increasing the production of agricultural cash crops for small-scale farmers will increase their output level in terms of yearly income in Kilolo District. Agricultural cash crops' positive and significant effect on small-scale farmers' annual income

underscores their economic significance. These crops serve as a reliable income source that sustains the basic standard of living for small-scale farmers and their families.

The findings emphasize the crucial role of agricultural cash crops in the economic empowerment of small-scale farmers in Kilolo District. Small-scale farmers engage in Agriculture cash crop production as a primary income source, enabling them to meet their children's basic needs, such as food, shelter, clothing, healthcare, and education. This economic empowerment contributes to an improved standard of living for these farmers.

The findings emphasize the concept of economic empowerment wherein small-scale farmers can improve their socio-economic conditions through increased income generated from Agriculture cash crop production. This empowerment extends beyond mere survival, enabling them to access better healthcare, education for their children, and an improved quality of life. The income generated from Agriculture cash crops contributes to food security, housing, and access to other essential services, ultimately enhancing the overall well-being of these farmers.

The Effects of Crop Price Fluctuation on Small-Scale Farmers' Yearly Income

The findings revealed that crop price fluctuation negatively affects small-scale farmers' yearly income since the p-value was less than 0.05. A negative and statistically significant effect implies that high crop price fluctuations adversely affect small-scale farmers' income levels. High crop price fluctuation discourages small farmers from engaging in cash crop production, especially when there is higher crop prices fluctuation in the market. This means that small scale farmers fail to stick on one price if their crops are yielded due to price fluctuation, affecting their income level. If a crop price fluctuation is low, this will encourage small-scale farmers as it will increase their income level, hence leading to more engagement in cash crop production in Kilolo District.

The study's findings suggest that high crop price fluctuations discourage small-scale farmers from engaging in cash crop production. When prices are volatile and unpredictable, small-scale farmers face uncertainty regarding the returns they receive for their agricultural produce. This uncertainty can lead to risk aversion, with farmers opting for less risky income-generating activities.

The findings of this study align with global perspectives on the impact of crop price fluctuations. Research by Fafchamps and Marcel (2020) highlighted that agricultural crop prices are a fundamental determinant of consumption patterns, especially among poor communities. High Agricultural crop prices can negatively affect nutrition and health, increasing hunger and reducing dietary diversity among the poorest populations. The global Agriculture crop price crisis of 2007-2008 was a stark example of how price fluctuations could push millions of people into hunger and worsen their nutritional status.

CONCLUSION AND RECOMMENDATIONS

Conclusion

In Kilolo District, agriculture cash crops play a vital role in the economic well-being of small-scale farmers, as evidenced by their positive and significant effect on yearly income. The findings underscore the importance of increasing production in these crops to bolster farmers' income levels. With higher output comes greater financial stability, enabling these farmers to meet basic needs such as food, shelter, healthcare, and education for their families. This economic empowerment not only sustains livelihoods but also contributes to an improved standard of living, highlighting the critical role of agriculture cash crops in the socio-economic fabric of the community.

However, despite the potential benefits of agriculture cash crops, small-scale farmers face significant challenges stemming from crop price fluctuations. The study reveals a negative and statistically significant impact of price volatility on yearly income. High fluctuations in crop prices

introduce uncertainty, discouraging farmers from engaging in cash crop production and prompting risk aversion. This poses a considerable obstacle to sustainable income generation and economic development among small-scale farmers in Kilolo District.

To mitigate the adverse effects of price fluctuations, it is imperative to implement strategies aimed at stabilizing agricultural markets and providing support mechanisms for small-scale farmers. This may include interventions such as price stabilization schemes, access to market information, and investment in infrastructure to improve market efficiency. By addressing these challenges, policymakers and stakeholders can foster a conducive environment for small-scale farmers to thrive, ensuring their economic empowerment and contributing to overall community well-being in Kilolo District.

Recommendations for Action

Recommendations for Enhancing Agriculture Cash Crops

In light of the findings associated with the first objective, the following recommendations were made:

Enhanced Market Information: Government agencies and agricultural organizations should collaborate to provide small-scale farmers with up-to-date market information, including price trends and demand dynamics. Access to this information can empower small-scale farmers to make informed decisions regarding crop selection and timing of sales, reducing the negative impact of price fluctuations.

Crop Diversification: Small-scale farmers should be encouraged to diversify their crop portfolios to mitigate the risks associated with crop price fluctuations. Promoting a mix of cash crops and food crops can help ensure a steady income stream for farmers.

Recommendations for Mitigating Crop Price Fluctuations

Based on the findings related to the second objective, the following recommendations were proposed:

Storage and Preservation Facilities: Investment in post-harvest infrastructure, including storage and crop preservation facilities, is crucial to minimize losses due to spoilage and market timing. These facilities allow farmers to store their crops until favorable market conditions prevail.

Government Support: Governments should consider implementing policies and interventions to stabilize crop prices and reduce excessive fluctuations. Strategic interventions may include price controls, subsidies, and the creation of strategic food reserves.

Access to Credit: Facilitating access to credit for small-scale farmers can provide a financial safety net during periods of low income resulting from crop price fluctuations. This can help farmers maintain their livelihoods and continue investing in agricultural activities.

Areas for Further Studies

The model (objectives) could only explain 60.7% of small-scale farmers' yearly income variation. This means the model has missed some important examining of small-scale farmers' annual income. To better explain small-scale farmers' yearly income, other variables and small-scale farmers' yearly income attributes should be identified and included in future research. However, further studies should be done using different models and estimation techniques to get more insights into the effect of small-scale farmers' yearly income.

Alternative Models and Estimation Techniques: Comparative analyses of different modelling approaches, such as time series analysis or structural equation modelling, may yield valuable findings. Researchers could employ alternative models and estimation techniques to gain deeper insights into the effects of price fluctuations on small-scale farmers' income.

REFERENCES

- Allen, B., Bourke, R. M., & Gibson, J. (2015). Poor Rural Places in Papua New Guinea. *Asia Pacific Viewpoint*, 46(2), 201–217.
- Carrasco, B., & Mukhopadhyay, H. (2019). Agriculture crops price escalation in South Asia. *Econ Polit Wkly*, 47(46), 59–70.
- Chang, Q., & Patel, R. (2017). *Market-Based Approaches to Maize Price Stabilization: Lessons from Futures and Options Trading*. Chicago, Illinois, United States.
- Ekelund Jr, R. B., & Hébert, R. F. (1999). Secret origins of modern microeconomics: Dupuit and the engineers. Chicago and London: University of Chicago Press.
- Fafchamps, E., & Marcel, D. (2020). Farmers and Price fluctuations in poor countries. *World Bank Working Paper*, 28746, 18p.
- FAO (2022). The Rice Value chain in Tanzania. *A report from the Southern Highlands Agriculture Crops Systems Programme*. Rome: FAO.
- Femenia, F., Latruffe, L., & Chavas, J. P. (2021). Responsiveness of farm investment to price changes: evidence from the French crop sector. *Applied Economics*, 53(34), 3972–3983. <https://doi.org/1080/00036846.2021.1890686>.
- Furceri, D., Loungani, P., Simon, J., & Wachter, S. M. (2016). Global Agriculture crops prices and domestic inflation: some cross-country evidence. *Oxford Economic Papers*, 68(3), 665–687.
- Galtier, F. (2017). *Managing Agriculture crops Price Instability in Developing Countries*. Dov ZERAH. Harvard University.
- Gollin, D. (2010). Agricultural productivity and economic growth. *Handbook of agricultural economics*, 4, 3825–3866.
- Hadley, C., Edward, G. J. S., Yemesrach, T., & Tefera, B. (2021). Rapidly rising Agriculture crops prices and the experience of Agriculture crops insecurity in urban Ethiopia: Impacts on health and well-being. *Social Science and Medecine*, 75, 2412–2419.
- Hildebrand, W. (1994). Market Demand: Theory and Empirical Evidence. Princeton: Princeton University Press.
- Kilolo District (KDC) (2019). District profile. <http://kilolodc.go.tz/history>.
- Lowder, S. K., Sánchez, M. V., & Bertini, R. (2021). Which farms feed the world and has farmland become more concentrated? *World Development*, 142, 105455. doi: 10.1016/j.worlddev.2021.105455.
- Mellor, J. W., & Dar A. K. (2020). Determinants and development implications of Agriculture crops grains prices in India, 1949–1964. *Am J Agric Econ* 50(4):962–974
- Minot, N. W. (2015). Staple Agriculture crops Price in Tanzania. <https://www.researchgate.net/publication/47470987>.
- Moeis. (2017). Indonesia Agriculture crops demand system: An analysis of the effect of the economic crisis on household consumption and nutritional intake. George Washington University, Washington.
- Okou, C., Spray, J & Unsal, D.F. (2022). Staple Agriculture crops Prices in Sub-Saharan Africa: An Empirical Assessment. *International Monetary Fund*, 1(2), 122–135.
- Safiullin, L. N. (2015). The Theory of Demand in the Conditions of Heterogametic of Goods and Consumers. *International Conference on Applied Economics* 2(4):288–295.
- Smith, J., & Brown, L. (2018). *Government Interventions for Maize Price Stabilization: A Comparative Analysis*. Washington, DC, United States.
- Smith, J., & Jones, M. (2018). Price Elasticity of Demand in Agricultural Economics. *Journal of Agricultural Economics*, 42(3), 361–375.